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ANNUAL REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1903.

BY

C. C. GEORGESON,
Special Agent in Charge.

[Reprint from Annual Report of the Office of Experiment Stations for the year ended June 30, 1903.]

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ANNUAL REPORT OF THE ALASKA AGRICULTURAL EXPERIMENT STATIONS FOR 1903.

By C. C. Georgeson, *Special Agent in Charge.*

Station work has been in progress at Sitka, Kenai, Copper Center, and Rampart. At the three former stations regular forces of station workers have been employed, while at Rampart the cleared land on the reservation has been cultivated for the station by a citizen of the town. We have cooperated with Rev. C. P. Coe in the cultivation of a tract of 20 acres on Wood Island, and to a certain extent we have cooperated with about a thousand citizens of the Territory by supplying them with seeds and aiding their work by correspondence, in return for which they are required to report results.

At the headquarters station we have given our attention mainly to horticulture and particularly to establishing a small nursery with a view to propagating and disseminating hardy varieties of fruit. Some varieties of grain have been tested. The headquarters building has been completed and a frost-proof cellar has been constructed for the winter protection of trees and roots.

We began experiments at Copper Center, where 9 acres were cultivated, resulting in successfully maturing many kinds of barley and oats. Six acres more have been cleared and broken and a log house has been put up for quarters for the superintendent.

At Kenai Station 15 acres have been under culture and 6 acres more have been cleared and broken. The grain did not mature at Kenai this year. It is becoming apparent that grain growing is uncertain near the coast. But forage can be produced in abundance, and it seems wisest to confine our work at that station mainly to animal industry.

The special agent has, as in former years, supervised the weather service in Alaska, consisting entirely of voluntary observers. He has also served as special disbursing agent of the Treasury Department and as quartermaster's agent of the War Department, in so far as these functions might facilitate the investigations in hand.

The special agent visited the stations at Copper Center and at Kenai the past season, and also other points on Cook Inlet.

The correspondence connected with all these matters has been quite large and has required much time and attention.

A BRIEF REVIEW.

Before proceeding to consider in detail the present year's work, it appears desirable to review briefly the work accomplished up to the present time, in order to answer some of the questions which are asked in regard to our work and the outlook for the future.

The Secretary of Agriculture began investigations on the agricultural possibilities of Alaska in 1897. These investigations were limited that year, however, to journeys in the Territory by three gentlemen, namely, Dr. Walter H. Evans, of the Office of Experiment Stations; Mr. Benton Killin, of Portland, Oreg.; and Rev. Dr. Sheldon Jackson, general agent in charge of education in Alaska. The trips of the two first-named gentlemen were confined to the coast region, Doctor Evans going as far west as Unalaska, and also up Cook Inlet. Doctor Jackson made observations along the Yukon while descending this river in the interest of his own special work. Doctor Evans made on his trip a valuable botanical collection confined chiefly to economic plants, with the view of learning what the country afforded in the line of native products. This collection was eventually placed in the National Museum. The report of these three gentlemen is the first authentic information given to the public in regard to the agricultural possibilities in Alaska. It contains statements concerning settlements along the coast, the native flora, and the individual views of the travelers as to the value of the country.

In April, 1898, the writer was sent to Alaska to inaugurate actual experiments in the growing of vegetables and cereals. Hardy vegetables had been grown by settlers in southeastern Alaska and at Kadiak, but so far as can be learned, cereals had never been tried, and few if any settlers in Alaska believed that they could be grown. He was instructed to establish headquarters at Sitka, and to examine the coast region with a view to inaugurate experiments at suitable points, and to aid and cooperate with settlers in their efforts at gardening; to ascertain the value of native grasses and forage plants as feed for live stock, and particularly to experiment with their preservation in silos.

Before the writer became connected with the work a reservation was made by the President of the United States, under date of March 28, 1898, of a tract of land on Kadiak Island, comprising about a quarter section. The writer was instructed to establish the metes and bounds of this, with a view to its use as an experiment station.

At Sitka a reservation was made in the somewhat broken mountain valley back of the town for an experiment station, and by order of the President the lot known as "Castle Hill," which was the only piece of ground the Government had in the town which was not already dedicated to some specific use, was set aside under date of July 18, 1898,

as the site for headquarters building for the Alaska experiment stations. The reasons for locating the headquarters station at Sitka were accessibility and climate. It was deemed necessary to locate this station at a point which could be readily reached by the Department and which could at the same time be in reasonably easy communication with the rest of the Territory. Sitka was deemed to be that point. At that time there was no indication of a speedy opening of the interior. The coast region contained practically the whole population, and it seemed likely to remain the most important region for a long time to come.

The climatic conditions at Sitka were typical of those prevailing over nearly the entire coast region and came nearer to representing an average, both as to rainfall and temperature, in that region than did any other place which could be selected. Sitka was not selected because the conditions were especially favorable to agriculture, either as to soil or climate. On the contrary, it was held that it was unfair to locate experiment stations in the most favored spots, inasmuch as the results would be misleading when compared with results at other places. On the other hand, it was apparent that whatever could be done at Sitka could be done almost anywhere else in the coast region, and in some places much better; and in the light of later experience the choice of location for the headquarters station is in all respects a wise one.

Nothing was done toward improving the land or the erection of buildings this year. The season was spent in examining other portions of the coast region and making surveys of tracts suitable for experimental purposes. One of these was the reservation at Kadiak already mentioned. Another was the selection and survey of a station at Kenai.

The Kenai Peninsula has several thousand square miles of agricultural land on which grass grows abundantly. It can be readily cleared and made into farms, and the soil is suitable for the growth of cultivated crops. A tract of 320 acres, which was deemed a fair average of the land in that peninsula, was selected, and later reserved by Executive order for an agricultural experiment station. It is located back of the village of Kenai, at the mouth of the Kenai River.

By the courtesy of the governor of the Territory, the Hon. John G. Brady, who kindly lent us his garden for the purpose, we were enabled to make the first test of vegetables, grains, and grasses in that year. Many kinds were seeded, and it was found that early varieties of barley and oats matured. So far as known, grain growing had never before been attempted at Sitka or in southeastern Alaska, and the fact that any grain matured seemed so incredible that even old residents of the town did not believe that it could be done again.

At Skagway Mr. George Sexton was employed to grow a number of varieties of vegetables and grains, and here the results were the same as at Sitka. Oats, barley, and flax matured, while all the common hardy vegetables developed normally and proved to be of high quality.

As the net result of the first season's work, it was learned that grain could mature in the coast region, and that settlers could have good gardens, while the reconnaissance of the country resulted in the selection of locations for permanent stations. Observations of soil temperature and weather conditions were begun in the spring and carried on through the season.

The outlook seemed so promising that for the fiscal year ending June 30, 1900, Congress appropriated $12,000 for the further investigation of the agricultural possibilities of the Territory and for the inauguration of experimental work on the sites selected for stations. The writer was again sent to Alaska, with instructions to begin the erection of a headquarters building at Sitka, for which plans were provided; to begin the clearing and preparation of land both at Sitka and Kenai, and to continue and extend the work of testing vegetables and grains, not only at the chosen stations, but all over the Territory by distribution of seeds to settlers.

Equipments were purchased for the Sitka and Kenai stations, consisting of a yoke of work oxen for each place and the implements required for pioneer work. Two assistants were employed, one to take charge of the work at Kenai and the other to be located at Sitka. The expense of providing equipments and the cost of transportation and freight left comparatively little for the work of clearing and improving land.

The headquarters building was begun—that is, the shell was put up and the lower story so far completed that it could be occupied so as to save rent.

The further testing of cereals, flax, clovers, and vegetables was continued at the Sitka Station, and this year the results were even more favorable than the preceding year. Not only the barley and oats matured, but also spring wheat was now tried for the first time. Red clover seeded in the governor's garden in the spring of 1898 lived through the winter and made a most extraordinary growth, blooming in abundance and many of the earlier blossoms maturing seed.

Some patches of cultivated ground were rented at Kadiak and similar tests inaugurated there. Here the work proved almost a complete failure from several causes, the chief ones being that the soil was poor and gravelly, and that the early part of the growing season proved to be unusually dry.

We made our first test of the preservation of native forage in silo. By arrangements with the governor we filled the silo which he had just completed with a rank grass, locally known as beach grass (*Elymus mollis*), which proved a success. We likewise tested silage at

Juneau by cooperation with Mr. Thomas Knudson, who was induced to build a small silo in his barn the year before. Here the forage likewise kept well, and gave satisfactory results in feeding both horses and cattle.

The clearing of land proved to be a formidable task, especially at Sitka, where the stumps were large and very thick on the ground. We learned that this newly cleared land was practically sterile; that cultivated plants will not grow on it until its acidity has been neutralized and the inert plant food made available by culture and action of the elements.

At Kenai about 5½ acres of land were cleared and fenced. A selection of vegetables and grains were grown, and for new soil the results were good. Early varieties of spring wheat, barley, oats, and part of the flax and buckwheat matured. A log barn 34 by 12 feet was built, as was also a small log silo.

Data as to conditions in other parts of the Territory were collected; seed was distributed; observations of soil temperatures were continued, and the weather observer who was sent to Sitka by the Weather Bureau in 1898 having been withdrawn, the work of supervising the voluntary weather stations in the Territory was also assigned to the Alaska experiment stations.

During the season of 1900, while continuing work along the same lines as heretofore at Sitka and Kenai, our chief energies were centered on learning what the capabilities of the interior were for agriculture, and the special agent spent much of the open season on the Yukon. At Fort Yukon, situated north of the Arctic Circle, a tract of land was selected for possible use as an experiment station and surveyed; and a reservation of 320 acres was also made on the north side of the Yukon, opposite the town of Rampart, in about latitude 65° 30′, and a superintendent was hired to begin work at the latter place. A portion of the lower Tanana was also explored.

We cropped some of the new ground at Sitka. While early varieties of barley, oats, and wheat matured, it was again demonstrated that new land does not produce good crops. The growth was very uneven, and the condition of the soil as yet not suited for experimentation. Vegetables, too, did poorly on the new land. It became evident that it required drainage, culture, and fertilization before good results could be expected. This experience has been repeated every year since.

In 1901 it was demonstrated for the first time that grain would mature on the Yukon, north of latitude 65° N. Winter rye seeded in the fall of 1900 lived through the winter and matured seed by the beginning of August. Barley seeded May 23 was ripe by the middle of August. This was a valuable test. Mr. Isaac Jones, who had been at the Rampart Station since August, 1900, resigned, not wanting to stay there another winter, but in going out he made a reconnaissance

of the region, between Eagle, on the Yukon, and Valdez, on Prince William Sound. He found large bodies of agricultural lands, and there was every indication that farming could be made successful in many places and over large areas in this region.

At the Kenai Station a log house was built for a station building, 1½ acres of land were cleared, making the cleared land at that station about 7 acres, and a number of grains and vegetables were grown successfully, though the grain did not mature as satisfactorily as could be wished.

At the Sitka Station a barn 25 by 50 feet, 2 stories high, was partly completed, and a cottage 30 by 14 feet, 1½ stories high, was built on the farm. It was not completed. Much work was expended on draining and improving the land already cleared. We matured spring wheat, barley, and oats, and winter rye on old ground, and some varieties also on new ground.

Seeds were distributed to about 500 residents of Alaska. The supervision of the weather service was continued, as were the taking of observations on soil temperatures. We began cooperative work with Mr. C. P. Coe, of Wood Island.

Our main efforts during the year 1902 were directed to establishing and equipping a station in the Copper River Valley. To this end Messrs. F. E. Rader and J. W. Neal were sent to Copper Center in July, where a tract was selected for a temporary station and clearing begun. Mr. J. W. Neal was employed as superintendent of the station. He wintered at Valdez, and as soon as the trail was broken in the winter he began hauling in the equipment. It was an onerous task, very hard upon both men and horses.

At the Sitka Station a stone foundation was put under the headquarters building; we never had money to complete it, so a little work was done year by year. A blacksmith shop was built, and the barn and silo were completed.

At Kenai a cow was purchased as a beginning in live stock and 8 acres of new ground cleared, making 15 acres in all cleared at that station.

The season for grain growing was unfavorable all along the coast, and the grain did not mature well either at Sitka or at Kenai. Vegetables on the other hand grew satisfactorily.

The cooperative work at Wood Island was continued. For this the station supplied fertilizers and implements, and Mr. Coe carries on the work and reports the results.

THE OUTLOOK.

These investigations have proved that Alaska has agricultural capabilities beyond the most sanguine expectations entertained five years ago. We are also gradually learning to what lines of work each section is best adapted. In southeastern Alaska and as far west as Prince

William Sound gardening and berry growing are undoubtedly the industries best suited to the conditions. Grain can be matured in all of this section, but there are three drawbacks to its culture: In the first place the amount of land suited to grain growing on a scale commensurable with the ideas of American farmers is too limited. Except in a few places, farms of moderately level land between 50 and 100 acres in extent are hard to find. In the second place much of this land is overgrown with spruce and it would be too expensive to clear it for ordinary farm purposes. In the third place the excessive rainfall in the early autumn renders it difficult to secure grain crops in good condition except now and then when the rains hold off later than usual.

In the coast region west of Prince William Sound there is but little or no timber; instead the country is covered with a wealth of grass, which affords natural pasturage for live stock. The rainfall is rather less than in the wooded districts; hay making is possible, and, of course, winter forage can always be preserved in silos. Grain can be grown successfully there some years, in others not. At Wood Island, for instance, grain was not a success the present year, although it usually matures well and can be saved in good condition; any amount of forage can be produced. In short, the western coast region, including the Kenai Peninsula, is preeminently a stock country.

The vast interior of Alaska will be the farming country in the sense that it is adapted to mixed husbandry. The samples of grain which have been produced at the Rampart Station in about latitude 65° 30′ N., for the past two years, and the samples obtained from this our first year's work in the Copper River Valley, leave little doubt that grain can be grown in these two widely separated regions, and, by inference, elsewhere in the interior. Attention is called to the photographs of grains from these two regions given under their respective headings.

Such being the fact, what is the outlook for farming in Alaska and what are the chances of success for those who come here to take up homesteads? The primary notion of a farm is that it is a factory of food supplies; first, for those engaged in the work, and the surplus for those engaged in other lines of industry. Measured by this standard, the conditions in all sections of Alaska south of the Yukon are such that a good living can be made in one or the other lines of work usually classified as farming. That is, the products of the soil and animal industry will provide an abundant livelihood for all intelligent workers.

The numerous mining camps and the growing cities afford most desirable markets for the surplus above family needs. For confirmation of this I refer to the data published in letters from settlers. Of course markets are not always easily accessible, and a probable market should always be had in mind in selecting a homestead. Beef, mutton, dairy products, chickens, eggs, and garden produce will find a ready market in every settlement and mining camp at prices that leave a large margin of profit under proper management.

Hay and grain are shipped to Alaska in great quantities, and could just as well be produced here, with much profit to the producers. But there are many drawbacks to success that must not be overlooked, the most serious of which is at present the lack of adequate transportation facilities. While this condition makes prices for farm products abnormally high all over the Territory, and particularly at interior points, it also prevents the marketing of any produce at all over extended regions.

The austere nature of the climate is another obstacle. This is so evident as to require no comment. Again, there are the hardships incident to pioneer life everywhere, intensified in a measure by the isolation of the Territory, sparse settlements, and difficult communication. These, however, are yearly diminishing. Many of those who now make their living in whole or in part from the soil are single men, live in cabins, cook their own meals, and in the usual sense of the word have no home life.

The conditions are so diverse in regard to markets, and the crops most profitable to raise, that intending settlers should first come to Alaska and look over the country for themselves before they make a move of so great importance. It is impossible to advise anyone intelligently as to where he had better locate, and what he had better do on arrival, and one shrinks from the responsibility, so much depends on the individual. But with industry and a thorough understanding of conditions farmers can not only make a living in Alaska, but a competence, with greater ease and certainty than in many parts of the States.

PLANS FOR SCIENTIFIC INVESTIGATIONS.

The exigencies of the situation in Alaska have been such that nearly all the time and attention of the employees, both at Sitka and at the substations, have been required for pioneer work. The clearing of land on which to make experiments, the erection of buildings, the purchase of equipments, and the cultivation of experimental crops have absorbed the appropriations made for the Alaska stations.

We have spent much time and energy in collecting information from settlers in the Territory, and in encouraging them to undertake agricultural work. It is now time that work of a more scientific nature should be undertaken, without in any way abating the pioneer work. The high cost of labor, material, and of everything connected with work in Alaska makes it impossible for the station, with the amount of money allowed for its work, to hire specialists. I would therefore respectfully point out that much useful scientific work could be done if specialists now in the employ of the various bureaus and divisions of the Department could be assigned to investigations in

Alaska, in cooperation with the Alaska stations and along the lines of work which the stations should do were the money available.

As a beginning in this work we need a thorough investigation of the native grasses and forage plants, and a study of the way in which the more valuable ones can be rendered of practical utility under culture. Certain species of grasses grow most luxuriantly in particular localities, and native species of Leguminosæ, which may be valuable forage plants, grow in certain regions. The study of these plants and the ascertaining of their economic value are of first importance. It is believed that they will do better than introduced species. A specialist from the Division of Agrostology could spend two seasons in Alaska profitably. The Bureau of Chemistry could render aid by analyzing samples, so as to learn what rank native forage plants will take when compared with those under cultivation.

Much work should be done in the near future in plant breeding. Alaska is rich in native berries of many kinds, which are very palatable. The little native cranberry (*Vaccinium vitis-idæa*) is better flavored than the cultivated eastern cranberry. It grows in profusion nearly everywhere in the coast region and in most places in the interior. It could be improved in size and productiveness. Likewise the native salmon berry (*Rubus spectabilis*), which is a large, well-flavored berry. It could probably be improved by crossing with the raspberry. The native strawberry is a vigorous and hardy plant, and could be improved in productiveness and size of berry. So also with the crab apple, the huckleberries, and other native plants. This is proper work for the station, but the Department could aid in it. A general botanical survey of the Territory should be made and specimens for reference should be placed in the herbarium of Alaska plants which has been commenced at the headquarters station.

The soils of Alaska are in some respects peculiar. Much of the vegetable matter is only partly decayed. In places the soil is peaty, in other places sandy, gravelly, or clayey, each differing from the others in fertility and adaptiveness to crop culture. Soil surveys in two or three regions best adapted to agriculture would be of great value to the development of the country.

With the introduction of garden vegetables destructive insects are also appearing. Many complaints have reached the station from southeastern Alaska of insects which destroy root crops particularly, and also kale and similar crops.

The Alaska fund does not admit of the employment of a specialist to study this question, and valuable aid could be rendered to Alaska and doubtless much information collected if an entomologist from the Department could be assigned to duty in the Territory for one or two seasons. The headquarters station could provide laboratory facilities,

and all the stations could serve as centers from which specialists thus assigned could operate. The station could possibly also defray part of the expense while in the field. All this is work that should be done by the station, had it the funds.

An allied interest of scarcely less importance to the Territory is the question of the preservation and proper utilization of the forests. Southeastern Alaska has extensive forests of valuable timber. The best portion of it has already been exempted from use by the creation of a forest reservation. While it is wise to prohibit wanton destruction, it will retard development of the Territory to forbid the conservative use of matured timber. Government supervision is needed in the interior, as settlers come in even more than on the coast, for the reason that the timber there is smaller and that there is none at all over large areas and the merchantable timber is more easily exhausted. The wooded districts must furnish building material and fuel for large areas which have no timber. Timber grows slowly there, and unless the supply is husbanded now future generations are bound to suffer. Steps should be taken to protect the wooded districts from forest fires, which have already caused great destruction in many places, and the cutting of timber should be under the guidance of a forester. The experiment stations in Alaska could assist in this work if given the authority and men and means provided.

INTRODUCTION OF CATTLE.

The cattle which are brought to the settlements in Alaska are of no particular breed or type, and most of them contain some Jersey blood, Jerseys being somewhat numerous on the coast. These cattle are not well suited to the conditions. The cattle best adapted to Alaska should have a heavy coat of hair, like the Galloway or the West Highland cattle, to protect them from the cold rains of the coast region and the severe cold of the interior. The Government would confer a lasting benefit on the Territory by establishing a herd of one or the other of these breeds on Kadiak Island, where a reservation could be made for the purpose. If settlers were permitted to buy the increase at their market value for breeding purposes, the Territory would in a few years be supplied with a type much better adapted to the climate than are the cattle now brought in. I would recommend the Galloway breed.

In this connection it is pertinent to note that a company of beef and pork packers in Seattle has the past summer grazed a herd of about 250 head grade Herefords and about 9,000 sheep on Kadiak Island. It is understood that they have done well. One thousand of the sheep were brought up in the summer of 1902, and wintered in the open as an experiment. Several hundred of them were drowned on one occasion by the rising tide. but many of them wintered in fair shape.

Enterprises of this nature should be encouraged as long as they do not encroach on the rights of settlers. The grass is there going to waste. Turning it into beef and mutton is to transmute it to a useful purpose.

WORK AT SITKA STATION.

The cultural work at the Sitka Station is detailed in the following pages. The weather conditions, which are of such preeminent importance in the latitudes of Alaska, were partly favorable and partly not. The spring was late and cold, delaying planting. August was the most favorable month, having twelve clear days, and the temperature reached a maximum of 79° F., but growth had not been rapid enough up to that time. June had eight clear days, and July only five. The results were that all crops were late in maturing.

VEGETABLES.

The vegetables here noted were all grown on soil which had been cultivated but three years and which is far from being comparable with average good garden soil. It will take several years more to get it in good tilth.

Beans.—Broad Windsor, seeded May 21. June 15, germinated well; strong, healthy plants. July 1, very vigorous grower. July 15, 12 inches high, in bloom. August 1, no pods set yet. August 15, many pods set. September 1, a large number of pods ready for use.

The Windsor bean deserves to be cultivated in every Alaskan garden. The beans should be used when about full grown, but before they begin to ripen. They should be cooked like Lima beans, and compare very favorably with the latter in flavor. It is the one variety of bean which is hardy enough to grow successfully in Alaska.

Improved Golden Wax Bush, seeded May 21. June 15, only a few plants, yellow and sickly looking. July 1, growing slowly, first leaves out. July 15, sickly plants, very poor. August 1, plants small, buds formed, none open. August 15, only a few pods set. September 1, pods large enough to use as snap beans. The few plants which we attempted to raise produced about a quarter of a crop of marketable snap beans; still, on drier soil, they would doubtless have done better. Occasionally one hears of bush beans doing well, but ordinarily they are not a sure crop.

Thorburn Dwarf Lima, seeded June 8. July 1, germinated poorly, plants yellow and sickly looking; many plants pulled up or broken off by ravens. July 15, not doing well. August 1, failure.

Beets.—Extra Early Egyptian, seeded May 21. June 15, up and doing very well. July 1, growing slowly. The same condition July 15. August 15, doing well in last ten days. September 1, growing fast. October 3, not large, but of good quality.

Golden Tankard, seeded May 21. June 15, up and doing very well. July 1, growing slowly. July 15, making slow growth. August 15, doing better in last ten days. September 1, growing fast.

Mammoth Food, seeded May 21. June 15, up and growing some. Grew slowly during July. August 15, began to grow more rapidly. September 1, growing fast.

Eckendorfer, seeded May 21. June 15, up and growing some. Grew slowly during July. August 15, growing more rapidly than heretofore. September 1, growing rapidly.

All of these beets were small. The soil was too wet. Beets can be grown successfully in Alaska. The writer has seen them 4 inches in diameter on warm, well-drained soil.

Brussels sprouts.—Improved Half Dwarf, seeded in hotbed April 20. Plants set out June 6 and 9. July 1, growing rapidly. September 1, plants very thrifty, sprouts slow in developing, much variation between individuals. September 15, some plants slow in developing sprouts, others have fine auxiliary heads and are all that could be desired.

Cabbage.—Early Winningstadt, seeded in hotbed April 20. Plants set out May 27 and June 20. July 1, all doing well. July 15, all doing well, but the early-set plants are no better than those planted out four weeks later. August 15, thrifty, not heading. September 1, heads forming, none solid yet. September 15, fine solid heads.

Early Jersey Wakefield, seeded in hotbed April 20. Plants set out June 6. July 1, slow growth. July 15, growing quite well. August 1, growing nicely. August 15, thrifty, beginning to head. September 1, some heads bursting, excellent quality. October 1, very fine cabbage.

Early Summer, seeded in hotbed April 20. Plants set out June 6, 9, 12, and 20. July 1, growing rapidly. July 15, ahead of any other variety at this time. August 1, growing nicely. August 15, thrifty, but not heading yet. September 15, heading well. October 3, headed nicely.

Extra Early Express, seeded in hotbed April 20. Plants set out June 6 and 13. July 1, vigorous, making rapid growth. July 15, doing well. August 1, growing nicely. August 15, thrifty, not heading. September 15, heading well. October 3, headed nicely. A desirable early variety.

Late Drumhead, seeded in hotbed April 20. Plants set out June 6 and 13. July 1, making very slow growth. July 15, doing well. August 1, growing rapidly. September 1, no heads formed; plants thrifty. September 15, beginning to head. October 3, headed nicely. October 26, large solid heads still growing.

Danish Ball Head, seeded in hotbed April 20. Plants set out June 6, 9, and 13. July 1, slow growth; not fully established. July 15,

doing quite well. August 1, growing rapidly. September 1, large and thrifty, but no heads at this date. October 15, large, solid heads of fine quality.

Moscow, seeded in hotbed April 20. Plants set out June 20. October 15, small round heads on tall stalks. This variety has nothing to commend it. For a long time it gave little hope of producing more than small bunches of leaves, and several plants failed to head. The stalk is abnormally tall. Seed from Moscow, Russia.

Cauliflower.—Extra Early Snowball, seeded in hotbed April 20. Plants set out June 6 and 9. July 1, rather backward; slow in becoming established. September 1, very fine heads; quality excellent. Several heads 9 inches in diameter.

Carrot.—Chantenay Half Long, seeded May 20. June 6, coming up. June 15, making good growth. July 15, doing well. August 1, doing very well. August 15, making better growth than earlier in the season. September 1, very fine, of marketable size at this date and still growing.

Other varieties seeded were Long White, Half Long Danvers, Champion, and Half Long Scarlet Horn, but the ground proved to be too wet for normal development.

Celery.—Giant Pascal, seeded in hotbed April 20. Set out plants June 24. July 1, growing well. July 15, very yellow, poor prospects; that reset in spent hotbed doing well. August 1, that in spent hotbed doing well, ready to blanch.

Improved White Plume, seeded in hotbed April 20. June 24 set plants in spent hotbed. July 1, growing well. August 1, doing well. August 15, ready to blanch.

Golden Self Blanching, seeded in hotbed April 20. June 24 set plants in spent hotbed. July 1, growing well. July 15, doing well. August 15, ready to blanch; that which was transplanted to open ground was a failure. September 1, excellent; that which was left standing on spent hotbed is better than that which was reset. September 15, very fine, from 2 to 3 feet high.

The garden soil is still too raw and in too poor tilth to produce good celery, hence the plants set there did not do well. The rich soil in the old spent hotbed suited it and it grew to compare with celery found anywhere.

Kale.—Dwarf Green Curled Scotch, seeded in open ground May 21. June 6, up, very good stand. July 1, growing well. July 15, growing very fast. September 1, equals that reset from hotbed. September 15, very good. October 3, exceedingly fine.

Dwarf Green Curled Scotch, seeded in hotbed April 20. Plants set out June 9. July 1, very slow. August 1, growing slowly. August 15, growing better than earlier in the season. September 1, growing very well. September 15, very good. October 3, exceedingly fine.

Scotch Kale is one of the vegetables which should be found in every Alaskan garden. It never fails. It is raised almost as easily as turnips. It is hardy and can be left out under the snow all winter. In fact it improves in flavor by being frozen. It should not be eaten raw, however. It is not a salad plant, but boiled with meat and served in the various ways known to good cooks it is one of the most delicious greens grown.

Kohl-rabi.—Trondhjemsk, seeded June 9. The few plants raised grew into tender bulbs. It also is a vegetable specially adapted to northern climate. Can be sown in the open ground and thinned or in a hotbed and transplanted like cabbage. The stem forms a bulb at the surface of the ground of the size of a large turnip. It is also good cattle food.

Lettuce.—Big Boston, seeded in the open ground May 21. June 6, up, fair stand. July 1, doing splendidly. August 1, ahead of transplanted lettuce of same variety.

The same variety was transplanted from the hotbed May 27. It grew slowly, and August 1 was just beginning to head.

All varieties of lettuce do well in Alaska. No one kind can be recommended as suited to the whole Territory. The vigorous, large-growing sorts are as a whole to be preferred to the smaller and more delicate sorts. The variety known on the Pacific coast as the San Francisco Market (not grown at this station this year) is on the whole, perhaps, the best so far tested.

Parsley.—Extra Curled, seeded in the open ground May 21. A single short row grown at the station can not be surpassed. The leaves are fully a foot tall and form a thick mass of crisp green. It is one of the vegetables suited to Alaska and should be found in every garden, and it should be used much more freely than is generally the case.

Peas.—Hosford Market Garden, seeded May 21. June 6, up, good stand. June 15, growing well. July 1, 5 inches high, growing slowly, yellowish. July 15, 16 inches high, look well. August 1, in bloom. August 15, have formed some pods. September 1, most prolific variety, excellent flavor.

McLean Little Gem, seeded May 21. June 6, up and good stand. June 15, growing well. July 1, 6 inches high, good color. July 15, 18 inches high, a few blossoms. August 1, in bloom. August 15, has formed some pods. September 1, excellent quality.

Earliest of All, or Alaska, seeded May 21. June 6, up and good stand. June 15, growing rapidly, ahead of other varieties. July 1, 12 inches high, growing well, yellowish. July 15, 2 feet high, in full bloom. August 1, set pods. August 15, 4 feet high, pods large enough for use. September 1, very fine, quite prolific.

Dwarf Telephone, seeded May 21. June 6, up and good stand. June 15, growing rapidly. July 1, 8 inches high; doing well, but rather yellow. July 15, a few blossoms. August 1, set pods. August

15, 6 feet high, no pods mature enough for use. September 1, very vigorous grower, but not a prolific bearer, peas of good quality.

Swedish No. 6428, seeded June 8. June 15, just peeping through the ground. July 1, doing very well. July 15, not doing so well, leaves dropping off, 12 inches high. August 1, plants vary much in growth, not vigorous. August 15, in bloom. September 1, some pods.

Of the foregoing and, indeed, of all the varieties tested at this station, the sort known as Earliest of All, or Alaska, has done the best. It reaches a height of 3 to 4 feet, is an early bearer, and the peas are of excellent quality. This is one of the sorts we can recommend for general planting.

Potatoes.—Planted May 6, 7, and 8. August 1, growing well, in bloom, no apparent difference between the rows treated with sodium nitrate and those not treated. September 1 vines cover the ground, no effect of nitrate noticeable. October 1, tops frozen down. The potatoes were dug October 9, 10, 12, and 13; yield, 112 two-bushel sacks.

The lot on which these potatoes were grown is old ground and belongs to the Russian Church, but kindly loaned to the station. It is three-fourths of an acre in extent, and was manured with seaweed at the rate of 20 tons to the acre. The potato used is known as the Yakima, a rather long, white potato extensively grown about Yakima, Wash. It is probably the Burbank somewhat modified by long culture in that locality. This lot was planted to potatoes for two reasons: First, because the ground was so weedy as to be good for nothing else; and secondly, because there are very frequent demands on the station to furnish seed potatoes to the natives in various parts of the Territory, which demands we have heretofore been unable to comply with.

Half the plat was fertilized with nitrate of soda at the rate of 150 pounds to the acre, it being applied to six rows alternately—six rows being fertilized and the following six not. But as stated in the notes above, there was absolutely no effect from this application. The yield of potatoes was at the rate of nearly 300 bushels to the acre.

Rhubarb.—Seeded in the open ground May 20. June 15, a few seeds germinated, good plants. July 15, doing well, also that which was reset. August 15, growing well. The plants have made a satisfactory growth for the season.

Ruta-baga.—Large White. Seeded a short row May 20. July 15, rank growth of top, but root development slow. September 15, very good, getting large. October 3, roots are of normal size.

Sage.—Sown May 21. July 1, growing nicely. July 15, growing exceedingly well. August 15, very thrifty growth. September 1, very good. September 15, good plants, fine growth.

Tomato.—J. J. Bogardus' Monster, seeded in hotbed April 20. Set out June 12. June 15, disturbed by ravens. June 30, set more plants. July 1, plants set out mostly dead. July 15, plants left in hotbed doing well. August 1, plants in hotbed doing well, some buds formed, those transplanted making very little growth.

A few plants were set on the south side of the house in the warmest place that could be found. While the plants lived, grew, and blossomed, they produced no fruit.

Turnips.—The following varieties were seeded May 20: Purple Top Strap Leaf, two Swedish varieties (not named), No. 6178, yellow, and No. 6177, white, both from Mustiala, Finland. All made a normal growth and all suffered from the attacks of root maggot.

NURSERY WORK.

We have started a nursery on a small scale with a view of propagating fruit trees and fruit bushes for the purpose of distributing them over the Territory to be tested. Only hardy, early maturing varieties were selected.

The trees were planted 3 by 6 feet apart in a scion orchard for the purpose simply of propagation.

We also procured 500 seedling apple trees to use as stocks. Only a few were grafted, however, for the reason that the trees did not have wood for scions, having been pruned to a whip before shipment.

The new ground in which these trees have been planted is not in satisfactory condition for fruit trees. Nevertheless, nearly all of the varieties named have made a fairly good growth, as noted below. The fall rains have a tendency to induce a too late growth, and the wood has therefore not matured as it should have done before winter. This condition will probably be a serious drawback to the successful growing of fruit trees in the coast region of Alaska.

APPLES.

Duchess of Oldenburg, 19 trees, all alive and doing well. This variety seems to be the most vigorous of any in the list. Average growth for the season, 18 inches.

Red Astrachan, 19 trees, all lived and appear healthy. The growth was only moderate. The average length of the new wood was 16 inches.

Red June, 20 trees, healthy, but only moderately vigorous. Average growth was 16 inches.

Raspberry, 19 trees, made a vigorous growth; one of the strongest growers in the lot. Average length of the new shoots, 2 feet.

Yellow Transparent, 20 trees, thrifty, but only moderately vigorous. The new growth was not up to the average of the others. The average length of the new branches was 14 inches.

Maiden Blush, 20 trees, made a fairly good growth, and the trees are healthy. Average length of the new shoots, 15 inches.

Early Harvest, 19 trees, were backward at first, but later in the summer they took on new vigor. Average growth, 18 inches.

Sylvan Sweet, 20 trees, one of the most vigorous varieties in the lot. It has been thrifty from the start. New growth average, 22 inches.

Eureka, 20 trees, a few of the trees of this variety were backward, but the majority did well. The new growth in the latter averaged 24 inches.

Tetofsky, 20 trees, healthy, but slow growers. The average length of the new growth was 12 inches.

Bryer Sweet, 21 trees, started out well, but did not keep up a vigorous growth. Average height of the new shoots, 15 inches.

Lowell, 20 trees, moderately thrifty. Average growth, 18 inches.

Standard Hibernal, 3 trees, moderately thrifty. Average of new growth, 15 inches.

Hyslop, 1 tree, only moderately vigorous. Average of new growth, 9 inches.

Whitney Crab, 20 trees, strong growers and healthy trees. Average growth, 18 inches.

Martha Crab, 20 trees, like the foregoing the trees of this variety made a good growth. Average length of shoots, 18 inches.

Transcendent Crab, 3 trees, rather stunted and scrawny. Average of new growth, 10 inches.

CHERRIES.

English Morello, 11 trees, a few individuals rather backward, but the majority have made a rather satisfactory growth. Average length of new shoots, 18 inches.

Ostheimer, 18 trees, not so vigorous a grower as the English Morello. Average length of new shoots, 10 inches.

Early Richmond, 20 trees, this variety has exceeded all the rest in vigor. Average length of new growth, 25 inches.

Dyehouse, 19 trees, seem inclined to make a close, bushy top, but it made fine growth. Average length of new shoots, 20 inches.

PLUMS.

Forest Garden, 10 trees, leaves affected by a fungus toward the end of the season. Average growth, 18 inches.

Hawkeye, 10 trees, very thrifty, making a good showing for the season. Average growth, 22 inches.

Red June, 9 trees, much less vigorous. Average growth, 18 inches.

De Soto, 10 trees, very vigorous. Average length of new shoots, 2 feet.

These varieties will be propagated and distributed to various places in the Territory for trial.

We have a few blackberry bushes of the following varieties: Snyder, Turner, Taylor, and Fuller's Colorado. They are alive, but that about all that can be said of them at present. The blackberry is not likely to do well in Alaska.

RASPBERRIES.

The raspberry is indigenous to Alaska. It is found all through the central part of the Territory, and even north of the Arctic Circle.

We have 600 bushes of a variety common in the gardens about town; it is probably the Cuthbert. They do exceedingly well here. In addition we have a half-dozen bushes each of Miller and Loudon, both of which have made vigorous growth.

CURRANTS.

Currant bushes also do well in Alaska. We have some 200 bushes about evenly divided between the red and the white currants, which have been propagated from bushes found here in town. In addition we have a few plants each of Fay Prolific, White Grape, Victoria, Ruby Castle, and Manitoba Amber. We also have a few black currant bushes. These will be propagated to the extent of the wood they can furnish.

Of gooseberries we have a few of which the names are uncertain and more will be procured.

Of ornamentals we have a few bushes each of the Siberian Honeysuckle, the Siberian Wild Olive, Sand Cherry, *Rosa rugosa*, *Pyrus baccata*, the lilac, and the June Berry. It is hoped that we can add considerable to this list next spring.

STRAWBERRIES.

Of strawberries we have a start of the following varieties: Excelsior, Lady Thompson, Saunders, Haverland, Enhance, Bismarck, New York, Brandywine, and Bubach.

We have also in addition a start in the native wild berries with a view to see if they can be improved. They are prolific growers, but very poor bearers.

CRANBERRIES.

We obtained a few dozen cranberry plants from Wisconsin last spring, and most of these are alive, but it is a question if they will survive the winter. The native Alaskan cranberries, *Vaccinium vitis-idæa* and *Oxycoccus oxycoccus* are abundant in this neighborhood and yield berries of most excellent quality. We have set out patches of both species with a view to bring them under culture and see if they

are susceptible of improvement. The *Oxycoccus* is a very shy bearer, and in the wild state is not of much value on that account.

FIELD CROPS AND FORAGE PLANTS.

The season on the coast was not favorable to the growth of grain. The spring was cold and late and the fall began early. Nowhere on the coast have grains been a success this year. Nevertheless, a few varieties matured here at the Sitka Station.

It is becoming more and more apparent that the coast region is not well adapted to grain growing. Forage can be grown in abundance, but the difficulty of saving the grain, even when it matures, on account of the excessive fall rain, will render grain growing impracticable except on a very small scale. Hereafter grain growing at the Sitka Station will be limited to the testing of varieties which appear to have special merit.

The following notes were taken on the varieties tested this year. The patchy nature of the growth of all these grains was due to the soil:

BARLEY.

Lapland, seeded May 29. Coming up June 8. June 15, 3 inches high, fair stand, yellow in spots, but on the whole looks well. July 1, patchy; best 15 inches high; good color. July 15, 30 inches high; mostly very good; heading. August 1, 3 feet high; heads well filled; many small ones; a few smutty heads. August 15, heavy heads; stands up well; beginning to ripen. September 1, fine; ready to harvest. September 5, cut.

Success, sown May 29. Coming up June 8. June 15, 2½ inches high; thin, poor stand. July 15, not a success; very thin; a few spots growing well; probably old seed accounts for poor stand. August 1, 2 feet high, in full bloom. August 15, heads mostly well filled. August 29, well-filled heads, beginning to ripen. September 15, nearly ready to harvest. Cut September 21.

Sisolsk, seeded May 23. Coming up June 6, germinated slowly. June 15, 4 inches high, half stand. July 1, average 9 inches high, very thrifty. July 15, 2 feet high; has good color. August 1, 3½ feet high, good heavy stem, in full head, beginning to bloom. August 15, grain in dough, straw soft, somewhat lodged. August 29, beginning to ripen. September 15, ready to cut. Harvested September 19.

Manshury, seeded May 8. Germinated slowly on account of cool weather. Was up by May 25. July 1, 12 inches high, spotted, has good color. July 15, 2 feet high, looks well. August 1, 3½ feet high, generally good, in full head. August 15, badly lodged, short heads, well filled. September 10, ripe.

Finnish barley and Black Hulless barley were also seeded, but were failures, because the soil was not sufficiently subdued to grow grain successfully.

OATS.

Sixty Day, seeded May 23. Came up June 6. June 15, 3 inches high, good stand, looks well. July 1, 8 inches high, very thrifty growth. July 15, averages 20 inches high, looks very thrifty. August 1, 3 feet high, very fine, in full head. August 15, very fine, somewhat lodged, large heads well filled. August 29, nearly ripe, lodged badly. September 11, harvested. This is one of the earliest oats we have tested. It can be depended on to mature, but it has a weak straw and lodges badly. The grain is also small and light.

Burt Extra Early, seeded May 29. Came up June 8. June 15, 2½ inches high, fine even stand. July 1, 8 inches high, fine even stand and growth. July 15, 18 inches high, good color in best places. August 1, 2½ feet high, even stand, fully headed. August 15, medium heads well filled, standing well. August 29, well-filled heads, beginning to ripen. September 15, somewhat lodged, ripening. September 19, harvested.

This follows Sixty Day in earliness and it has a better straw and somewhat heavier grain. It, too, can be depended on to ripen.

Swedish Select, seeded May 7, germinated slowly. June 15, 4 inches high, good stand, looked well. July 1, best 15 inches high, growth spotted. July 15, just heading, poor spots treated with sodium nitrate show no more growth but better color than similar spots untreated. August 1, 3½ feet high, general average good, in full head. August 15, fine, stands well, large, well-filled heads. September 1, very fine, nearly ready to cut. September 15, ready to cut and harvested two days later While not an early variety it has nevertheless done well at this station for two seasons. It stands up well under the strain of severe storms, and it has an unusually large, plump grain.

Improved Ligowa, seeded May 29. Coming up June 8. June 15, 2½ inches high, excellent stand. July 1, 8 inches high, good, thrifty, even growth. July 15, best 18 inches high, good color. August 1, partly headed. August 15, medium heads lodged in places. September 1, very good, shows but very little signs of ripening. September 15, lodged badly, nearly ripe. This well-known variety requires too long time to mature to make it a sure crop every year. It has a fairly good straw and large, plump grain. It is a good variety for hay or silage.

Nameless Beauty, seeded May 29, came up June 8. June 15, 2½ inches high, looks well but thin stand. July 1, 6 inches high, very good, even growth. July 15, 18 inches high, generally very good. August 1, poorest in head, ranker growth just beginning. August 15, very even, medium heads, standing up well. September 1, very fine, lodged badly, little signs of ripening. September 15, ripening. September 21, harvested. One of the rankest growers we have tested

and excellent for hay and silage, but too late to mature on the coast before the fall storms set in.

WHEAT.

Romanow Spring, seeded May 7 came up May 23. June 15, very uneven stand; on high ground, 6 inches high; on poorer ground, 4 inches high. July 1, best 15 inches high. July 15, 2 feet high, good color, heading. August 1, 4 feet high, in bloom, heads good size, some smut. August 15, badly lodged, on which account development is retarded. September 1, fairly good, grain just in dough. September 15, heads small but well filled, grain plump, ripening. Cut September 19. Seed imported from Russia by the U. S. Department of Agriculture. It does not do as well here as did the seed of an earlier importation by the same name. This variety is the best spring wheat we have tested.

RYE.

Giant French Winter, seeded September 10, 1902. June 10, heading. June 15, 3½ feet high, heads 1½ to 3 inches long. July 1, 5 feet high, many short stalks, in full bloom. July 15, grain in soft dough. August 1, beginning to ripen, well filled, many small heads. August 15, nearly ripe. August 25, harvested. Of several varieties seeded this was the only one that did not winterkill. They were killed by too much water rather than severe cold. The heads are small but the grain is of fair quality.

FLAX.

Riga (for fiber), seeded June 4. Coming up June 15. July 15, 3 inches high, growing slowly, good color, badly mixed with mustard. August 1, 20 inches high, bloom buds formed. August 15, 2 feet high, in bloom. August 29, nearly through blooming. September 15, 3 feet high, badly lodged in places, seed fully formed, but not ripe. October 3, ready to pull. The ground was too wet for the best results, and not sufficiently subdued. The quality was injured by lodging of the straw. Good fiber flax can be grown on the coast wherever suitable soil can be found.

BUCKWHEAT.

Russian variety, seeded May 23. Came up June 6. June 15, has two leaves, fine stand, looks well. July 1, 4 inches high, growing well. July 15, 18 inches high, in full bloom. August 1, exceedingly fine, bees working on it vigorously. August 15, bloom nearly all dead, seed well formed, will yield well. August 29, nearly ripe. Cut September 12. Early maturing varieties of buckwheat may be depended on to mature in the coast region.

FORAGE PLANTS.

Flat pea (*Lathyrus sylvestris*), seeded June 8. July 1, no sign of germination. August 1, very good stand, plants small. September 1, making slow growth. This is the second attempt we have made to grow this forage plant. It was first seeded in 1898 and survived for three years, but at no time did it grow vigorously enough to make a promising forage crop when compared with clover and vetches. The present patch is located where it is hoped it may do better.

Red clover, seeded in the spring of 1902. July 1, just coming into bloom, very good, 20 inches high. July 15, 2 feet high, fine, full bloom. August 1, heads well filled with seed. August 15, seed yet soft. September 1, early heads have ripe seed.

White clover, seeded in the spring of 1902. July 1, 6 inches high, fine, in bloom. July 15, in full bloom, growing rapidly. August 1, heads well filled with seed. August 15, seed yet soft. September 1, early heads have ripe seed. Both red and white clover have done well at this station. The small patches on which they have been tested would indicate that they may be counted on to yield a large amount of pasture on old ground. On new ground the growth is spotted as in the case of grains. The summers are too wet, however, to cure clover hay except now and then, when the season is dryer than usual.

GRASSES.

The following species were seeded in trial plats in the spring of 1902. The ground was new and the growth uneven, particularly last year. This year the difference in growth in the same patch was less noticeable. None of them suffered in the least from winterkilling, and all matured seed. Tall meadow-oat grass (*Avena elatior*) is so far the most promising grass of the species here tested. In places it grew to a height of 6 feet and covered the ground densely with leafy forage. None of the grasses were cut until fall in order to watch the development of seed.

Perennial rye grass (*Lolium perenne*), June 15, 16 to 18 inches high, fair stand, headed. July 1, 20 inches high, fully headed, too stemy for hay. July 15, 2 feet high, in bloom. August 1, in bloom. August 15, seed matured. A lawn grass. The yield is too light for hay, but it will furnish early and late pasture.

Orchard grass (*Dactylis glomerata*), June 15, 2½ feet high, partly headed out. July 1, in full head, well leafed, make good hay. July 15, 4 feet high, in full bloom. August 1, heads well developed, seed in dough. August 15, seed in hard dough. September 1, seed ripe. A leafy pasture grass and one which will also yield considerable hay.

Timothy (*Phleum pratense*), June 15, 18 to 24 inches high, fair stand. July 1, just in head, average 2 inches in length, well leafed, make good

hay. July 15, in head, 3 feet high. August 15, seed in dough. September 1, seed ripe. While it has done well, this popular grass does not promise to be as valuable for this region as tall meadow-oat grass or orchard grass.

Red top (*Agrostis vulgaris*), June 15, 12 to 15 inches high, fair stand. July 1, 18 inches high, just coming into bloom, good stand and color. July 15, in head. August 1, no bloom yet. August 15, in bloom. September 15, ripe seed. Only the earlier promises to mature seed.

Tall meadow fescue (*Festuca elatior*), June 15, very thin stand. July 1, 2 feet high, in head, poor stand. July 15, in head. August 1, in bloom. August 15, seed in dough. September 1, seed ripe. A fairly promising grass.

Kentucky blue grass (*Poa pratensis*), June 15, 12 inches high, very poor, heading out. July 1, headed, fairly good. July 15, just past blooming. August 1, seed getting hard, good heads. August 15, seed mature. This plat happened to be seeded on a spot of poor soil. The chief merit of blue grass is that it is ready to cut for hay early in the season before the unsettled weather begins.

Tall meadow-oat grass (*Avena elatior*), June 15, heading out, excellent. July 1, 3 feet high, in full head, heads 4 inches long. July 15, 6 feet high, in bloom. August 1, heads and seed well developed. August 15, seed in dough. September 1, seed ripe. In point of yield ahead of any here tested. This moist climate stimulates it to very luxuriant growth.

Meadow foxtail (*Alopecurus pratensis*), June 15, 2 feet high, in bloom. July 1, 2½ feet high, in bloom very good, heads 2½ inches long. July 15, 3½ feet high, in full bloom. August 1, heads well filled, beginning to ripen. August 15, seed mature. Will have value as an early hay grass.

COPPER CENTER STATION.

Last year a few acres of ground were cleared near Copper Center and some winter grain seeded preparatory to opening an experiment station in the Copper River Valley, and Mr. J. W. Neal, formerly connected with the California Agricultural Experiment Station, was placed in charge. This year more ground was cleared in the spring, so that an area of about nine acres was seeded to spring grain.

The result this season has been quite encouraging, although as the weather reports from the station indicate, there has been frost in every month of the year, nevertheless Manshury, Lapland, Sisolsk, Royal, Trooper, No. 6175, Black Hulless, and No. 9133, barley, and Nameless Beauty, Burt Extra Early, Sixty Day, Finnish Black, No. 2800, and Swedish Select oats matured. Hardy garden vegetables grew well, as did also grasses and clover seeded this spring. Spring wheat did not mature. A frost on August 27 killed it before it was fully ripened. Plate V shows samples of the varieties of grain which ripened there.

While an experiment station must be maintained in the Copper River Valley, the present location of the station may not be found to be the most desirable. When railroads are built through this country the station should be moved to the railroad so as to be accessible. Two companies have filed plans with the land office showing the lines they have projected through this part of the interior, but it will be wisest not to select a permanent site for a station until one or the other of these railroads is actually built.

EQUIPMENT OF THE STATION.

A team of horses was secured last fall from the U. S. Geological Survey through the kindness of Mr. F. C. Schrader, the chief of a party which had been operating in the Copper River country. This party used a number of horses, which were discarded at the close of the season, and Mr. Schrader turned two of the best over to Mr. Neal. These horses were fed in Valdez until trail work began in the middle of January. Mr. Neal then started to haul out the station equipment, consisting of two plows, a smoothing harrow, a disc harrow, a mower, a light wagon, a grain drill, a complete set of carpenter's tools, hand tools, spades, shovels, mattocks, hoes, rakes, scythes, forks, axes, etc.; also tents and camping outfit, feed for the horses, seed grain, provisions, and household effects for himself, aggregating about 4 tons in weight.

To move this outfit 105 miles over a rugged mountain chain through a country where there are no roads and where the snow was in places 15 to 20 feet deep, or even more, and the temperature most of the time from 10 to 30 degrees below zero was a formidable task, the hardships of which it is difficult to appreciate.

METHOD OF TRANSPORTATION.

A brief description of the present mode of hauling supplies into the interior is therefore pertinent. The snowfall on the Valdez side of the mountains aggregated 78 feet in depth last winter. It may readily be comprehended what it means to make a road through such a depth of snow. No one man with a team could make any progress at all, but by joining forces with many others it is made possible. All who have goods to move begin at the same time and cooperate. A force of men, with as many horses as are available, is sent ahead to break the trail each morning. They go as far as they can and return to camp by noon. They may make 7 or 8 miles or they may make 2 or 3, depending upon the depth of the snow and the nature of the ground. In the afternoon they hitch to their sleds and pull their goods over the broken trail until nightfall, when they make camp, and next morning the procedure is repeated. They cooperate in breaking trail, but the trail once broken each man hauls his own goods.

ALASKA STATIONS—SAMPLES OF BARLEY AND OATS GROWN AT UNITED STATES EXPERIMENT STATION IN THE COPPER RIVER VALLEY, SEASON OF 1903.

For hauling they use a style of sled which has been invented for the purpose. It is lightly but strongly built, 9 feet long and 30 inches wide, and about 1 foot high. The runners are rounded at both ends, so it can be pulled forward or backward with equal ease, and for this reason these sleds are usually styled "double-enders." The goods to be moved are securely strapped to these so that nothing falls out when they turn over, which they usually do many times a day. Where the ground is level and the trail has become firm one horse can pull two loaded sleds. Under less favorable conditions it takes a horse to each sled, and sometimes two. When a man has much goods to be moved he unloads his sled at the terminus of the broken trail and goes to the camp, reloads his sleds, hauls up this load, and so on again and again, until all the goods have been removed to the new camp.

The difficulties encountered can not be fully conveyed in words. The soft snow is packed down by the horses and sleds to a deep rut the width of the sleds, with walls on either side several feet high. The travel also wears holes in the trails due to the uneven surface. A loaded sled runs swiftly down a little incline and buries itself in the snow at the bottom. The hole thus formed is deepened by each passing load until the trail in many places becomes a succession of short hills and hol lows, which taxes the draft animals greatly. These holes are usually referred to by freighters as "chuck holes."

The loaded sleds always have the right of way, and in going back empty the driver must pull into the soft snow to let the loads pass, and frequently horses sink in so deep that it takes hours to dig them out. The camps can not be far apart. If they are, there is danger that the trail will drift full and require breaking anew before the freight can all be hauled up. Mr. Neal spent three months with the team and one man to help him in moving the equipment from Valdez to Teikhel, 48 miles inland. At this point the horses gave out and could do no more. The season was now so far advanced that there was danger of the ice breaking up and making further traffic impossible, for the winter trail follows the streams and lakes as far as practicable because of the easier travel on the ice, and Mr. Neal was compelled to go to Copper Center very light and to hire the more necessary things hauled while the less necessary portion of the equipment was stored in tents at Teikhel.

The method of transportation here described is the only practicable one by which the interior can be reached with anything like large quantities of goods. Professional freighters charge 20 cents per pound for hauling goods from Valdez to Copper Center on the snow, and after investigating conditions I am satisfied that this rate of charge is not unreasonable.

In summer everything must be carried in on the backs of either horses or men, the rate then charged by freighters being 50 cents

per pound. Considering that it takes from eight to ten days to make the hundred miles with a heavily loaded pack train, that in the average condition of the trail a horse can not carry much over 200 pounds, and that horse feed, hay and oats alike, costs 25 cents per pound on the north side of the summit, this rate is not unreasonable.

THE TRAIL.

The trail is known as the United States military trail and was constructed by the War Department in 1898 and 1899. For some miles out from Valdez it is cleared about 12 feet wide, over level ground, and in dry weather is a very good road; but when the mountains are reached it narrows into a winding bridle path, the trees and rocks having been cleared away in places so as to make it passable for horses. Through Keystone Canyon a very excellent piece of trail has been constructed by blasting a path along the side of the mountain for a distance of 4 miles. Considerable work has also been done in bridging the larger streams and in making a zigzag path up the deep sides of Stewart Divide. The trail as it now exists is of very great value in the development of the interior, and in dry weather it can be traveled with comparative ease; but after heavy rains it abounds in mudholes, making it well-nigh impassable.

The summit of the mountains is reached some 20 miles from Valdez. In summer time it offers no great obstacle to traffic, as it is not a steep climb, but in winter the frequent and severe storms and deep snow on the summit render the passage at times dangerous. The Stewart Divide, which is rather a steep ridge some 40 miles from Valdez, is much more difficult to climb, because it is steeper, the trail having to zigzag in places to reach the top of the sharp ridge. The winter travel follows the streams around this ridge. Aside from these two elevations there is no arduous climb to make, but the traffic over the low places where horses sink to their bellies in mud is even more laborious than to go over the hills, and crossing some of the streams which are not bridged is dangerous when the water is high.

THE COPPER RIVER COUNTRY.

The valley of the Copper, speaking in general terms, is a basin surrounded on all sides with mountains. It has an area of about 10,000 square miles, which will have more or less value as farming and grazing lands.

The streams tributary to the Copper have also valleys of considerable extent, and afford equally good farming land. At a conservative estimate these tributary valleys will have an area of 5,000 square miles of more or less valuable agricultural land, or a total area of 15,000 square miles.

The floor of the main valley is arranged in a succession of benches, or large terraces, which rise abruptly one above the other toward the north, varying in height from 100 to 200 feet, or even higher. Each bench is comparatively level on top and comprises an expansive area. Parallel with the Copper is another system of benches of the same formation but not so wide. At the mouth of the Klutena, where the experiment station is temporarily located, these benches vary from a quarter of a mile to a mile or more in width.

The whole country was nearly covered with spruce forest, but extensive fires destroyed it over large areas many years ago. Here and there willow thickets have sprung up since the fires, but everywhere the dead and charred trunks are standing or lying on the ground. This land is comparatively easy to clear, and it affords an abundance of good, dry fuel for the use of settlers. This dead timber is small, most of the trees not being much larger than large telegraph poles, but some of the live timber is comparatively large.

The soil is generally a light loam, that is, of a more or less sandy or gravelly nature, but in low places it is rich in humus and occasionally peaty. The subsoil, so far as the writer had opportunity to examine it, was found to contain a large amount of a coarse gravel, and the surface loam varied from 6 inches to 2 feet in thickness. This formation while a "warm" soil, and therefore favorable to a rapid growth, will also be liable to suffer from drought and, so far as our data at present available will enable us to judge, the early part of the season throughout the Copper Valley is deficient in rainfall. The writer is informed that there are also extensive areas with a clay subsoil, and it is a question which is the more preferable, the gravel or the clay; the former being warm but lacking in moisture, the latter being cold but suffering less from drought.

Nine acres had been cleared and seeded to many varieties of grains, grasses, and vegetables. At the time of my visit the grains were still small, most of them not having headed, but as an example of the rapid growth in this region, the barley and oats were ripe four weeks later. More ground was being cleared and next year the station will have 16 acres in cultivation. Some of the grains promised well, others were stunted. It was noticeable that wherever the ground had been fertilized by the ashes of a burnt brush heap the growth was very much more vigorous than in places not thus fertilized.

Vegetables promised well. Turnips, radishes, and lettuce had been in use for some time, and peas were ready for the table by the middle of July.

Mr. Neal is an enthusiastic, industrious, and careful worker, and he deserves much credit for the results accomplished.

The team of horses owned by the station is worn out and was not considered worth wintering, inasmuch as the cost of keeping a horse

through the winter months is almost equal to his original cost; therefore Mr. Neal was authorized to dispose of this team to best advantage, and to select a stronger and heavier team, which had not been injured by packing on the trail, to take their place. Such a team has been found and we have made arrangements to have it wintered at Valdez, for the reason that trail work begins at that end, and we have still some equipment to haul in and it is impossible to bring a single team from Copper Center to Valdez until the trail is broken.

The writer left Valdez on July 13 and arrived at Copper Center, the name given to a few cabins located at the junction of the Klutina with the Copper, on July 18, the trip taking six days, which is about the average time. The station clearing is located about three-fourths of a mile north of Copper Center, on the first bench. (Pl. VI, fig. 1.)

I consider the soil on the station too light and too thin to stand continuous cropping for very many years, and for this reason I selected a tract of land of a stronger nature, located about midway between Tonsina Bridge and Copper Center, for possible future use. The lines run east and west for 2 miles along the shores of an unnamed lake and north and south for 1 mile, so that it comprises about 2 square miles. A large portion of it has a gentle slope southward toward the shores of the lake. The soil is a light but rich loam, and the subsoil is a porous clay carrying considerable gravel, but will not be likely to suffer greatly from drought. I recommend that this selection be withheld from settlement temporarily, until the building of the railroad shall decide where the permanent station had better be located. In the meantime it would appear best to continue work at the present location at Copper Center. There are many thousand acres of land of similar character, and we ought to ascertain what its value is for agricultural purposes.

I recommend that the work of clearing, breaking, and bringing under culture be pushed with vigor until the station has a hundred or more acres under plow, in order that we may test grain growing on a scale which shall give us decisive results. To do this will necessitate the hiring of much labor for a year or two, and it must not be forgotten that common labor costs $5 per day.

I would not recommend the erection of more buildings than are absolutely necessary, and these should be of an inexpensive character, built from the material at hand.

ECONOMIC CONDITIONS IN THE COPPER RIVER VALLEY.

The present high cost for transportation of all of food supplies and all other necessary articles makes living very expensive. As an example of the cost of some common commodities I quote the following prices:

Flour, per 50-pound sack, $15; ham and bacon, per pound, 40 cents; canned meats, per can of 2½ pounds, $1; canned milk (Eagle), per can,

FIG. 1.—ALASKA STATIONS—SITE OF COPPER CENTER STATION.

FIG. 2.—ALASKA STATIONS—FIRST STATION BUILDING IN COURSE OF CONSTRUCTION AT COPPER CENTER.

75 cents; tea, per pound, $1; coffee, per pound, 75 cents; sugar, rice, beans, sago, dried fruits, corn meal, and oat meal, per pound, 35 cents; sardines, oysters, and deviled ham, per can, 50 cents; lunch tongue, per can, 75 cents; potatoes, sliced and dried, per pound, 50 cents; salt, 3 pounds, $1; hay, per pound, 25 cents; oats, per pound, 25 cents; kerosene, per 5-gallon can, $10.

These prices are due to the cost of transportation. The further one goes inland the higher the cost. There are no regular stores beyond Copper Center and there are therefore no fixed values.

Game is becoming scarce and beef or mutton can seldom be had, and therefore have no fixed prices. The writer learned on the best authority of instances which illustrate the situation in this regard. A steer was bought in Valdez for $125. The purchaser put a pack of 250 pounds on his back and drove him to a mining camp in the Slate Creek district along with a train of pack horses. He received $1 a pound, or $250 in freight for the goods the steer carried. He then slaughtered him and sold the meat for $1 a pound. On the other hand, a dozen steers were driven into the camp on the Nizina, 200 miles distant, the past summer, but there was no demand for this meat, and they had to be driven back to Valdez and sold at local prices.

The prices of hay, oats, and other farm products are attractive to farmers, and there is no doubt whatever but that money can be made in producing these things if the farmer is once established, has his farms cleared up and in running order. The question is if the necessary outlay to get this start will not exceed the means of the class of farmers who are likely to settle in the Copper River Valley. In the first place, the cost of landing his goods and family in Valdez is considerable, but leaving this out of account the cost of transporting his equipment, say as far as Copper Center, is almost prohibitive if he has to hire it done, and it will be high even if he can do the work himself. He should carry with him a year's provisions, considerable feed for his live stock, the necessary implements and seed grain, and, if he has a family, also some household goods. If he can reduce the equipment to 5 tons, or even 4, it will cost him 20 cents per pound, or from $1,600 to $2,000 to land his goods in the farming region, about 100 miles from Valdez. If he can do it himself with his own animals, and he does not consider the labor and hardship involved, it will, of course, cost him only the price of provisions and feed, sleds and other necessary equipment for the trip, and the labor he will find necessary to hire to help him over the hard places. In that case no estimate can be put on the cost, but it will be some hundred dollars at least.

The natives of the region seem to be inferior to the Indians on the coast in physical vigor and general thriftiness. They complain bitterly that the white man scares the game away, and that furs are also becoming scarce. Unless they learn to work and earn wages, to cultivate gardens, and acquire habits of greater thrift, they must inevitably

succumb. At present they live almost wholly on salmon, and fortunately this year the run of salmon was good, so they have laid in a good store for winter.

A WAGON ROAD NECESSARY.

Confronted by these facts, it does not seem likely that even the Copper River Valley, which is, perhaps, the most promising agricultural region in Alaska, can be settled very fast. But a good wagon road would solve the problem. The settler could then make his move in summer. He could then hitch his plow horses to his own wagon at the wharf in Valdez, and drive in at his leisure, grazing his live stock on the road as he went. The cost would then be represented chiefly by his own time and labor; and he could then make several trips until all his goods were transferred to the homestead of his choice, but until a wagon road is provided this is impossible. Now, it is not likely that such a road will be built by private enterprise. To get returns on the investment a private road would be compelled to charge toll, and the building of a railroad, which must eventually come, might deprive it of much traffic. A Government road is necessary to settle the country, and in my opinion it will pay the Government richly to build such a road.

Here is a region which will give homesteads to 30,000 families. It is analogous to a man owning a valuable piece of real estate which must be made accessible before he can dispose of it. If the region were owned by capitalists and they desired to have it settled they would not long consider the question of making it accessible. The returns to the Government would be the building of a State, enlarging its productive territory, and providing homes for its citizens, which are the proper and legitimate causes for expenditure.

The cost of building a good wagon road will depend upon the way the work is handled. By utilizing the work already done on the military trail $100,000 should go very far toward making a good road. In many places there is a hard natural roadbed, which would require but little work; in other places, where the ground is soft, it would be more expensive; but there is an abundance of timber in those places, and rocks are at hand everywhere. The somewhat rude log bridges, which now span the larger streams, can be made to last for years if they are watched and repaired when they need it. In a few places the route will deviate from the military trail in order to follow easier grades and to select firmer ground, and in a few places it will be necessary to blast out a roadbed, but on the whole the task is not a formidable one.

A wagon road is necessary, even if a railroad is built. The tariff on a railroad, without competition, in a new country will not be light, and if there is no other means of reaching the country freight rates

will keep many settlers away. A wagon road will make the people in a measure independent.

Attention is called to Mr. Neal's report, herewith submitted, and also to the weather conditions and soil temperatures recorded at this station during the past year.

REPORT OF J. W. NEAL, SUPERINTENDENT OF COPPER CENTER STATION.

COPPER CENTER, ALASKA,
September 10, 1903.

DEAR SIR: I herewith submit the report of the season's work for 1903, confining my notes strictly to the crop experiments and station work generally.

Receiving the station equipment at Valdez, I began moving the same over the snow and ice toward the Copper Center Station January 20, employing one man from February 1 and some additional help at Teikhel. The trip proved long and arduous. We arrived at the station April 26 with most of the equipment, including all the seed and most necessary implements to prosecute the season's work.

At this date the weather was warm and the snow leaving very fast. On May 1 the snow had entirely melted off the 9 acres which we had cleared ready for the plow, and by May 8 the frost was sufficiently out of the ground to begin plowing and cultivating the soil. Notwithstanding the fact that our team was almost exhausted by the long stage of freighting, the soil new and full of roots, and a limited supply of feed, we had 5 acres ready for seeding by May 19, and on May 20 we had seeded plats of every kind of seed at hand.

While the snow was leaving and frost getting out of the ground we turned our attention to clearing. After the seeding was finished we built about 1 mile of fence, inclosing some 40 acres. We then began to get out timber and laid the foundation for a log cabin 16 by 24 feet, exterior dimensions (Pl. VI, fig. 2). Leaving for Valdez July 2 to meet the special agent in charge, I set the workman to clearing land for such time as he could leave the growing crops. At this time I hired a native at $3 a day to help in clearing, but natives soon tire and he left us after five days. No other help was then available.

After my return from the trail I succeeded in hiring a white man for a few days at $5 per day, and we resumed work on the cabin, but he soon left us and I had to turn my attention to the crops, collecting grain samples, cutting some frosted wheat for hay, and reaping and thrashing the barley and oats which matured excellent grain. At the close of my report the cabin is up, ready for the roof, which we expect to put on before the snow flies. We will have to store the hay and implements in tents for want of time to erect sheds.

Aside from the 5 acres seeded May 19 and 20, we seeded some 4 acres a few days later. We have added to our clearing some 6 acres,

which will be broken this fall and prepared for spring seeding. Have rebroken 2 acres of the spring cultivation and seeded the same to winter wheat with a 10-press drill. This grain is up and growing well.

WEATHER CONDITIONS.

During the fore part of the season the weather conditions proved very unfavorable this year, there being an excessive amount of snowfall all over the valley and a late spring, together with a very light rainfall during the early summer; the crops made a late start and suffered an early fall.

The temperature fell below 30° F. every month during the summer. In May the minimum temperature was 23° F., falling to 32° F. 15 days in the month; in June falling to 32° F. and under on 3 days; July 12 to 29° F., killing some tender plants and rye then in blossom, and August 30 to 24° F., falling to 30° F. on the 26th, frosting hard every night thereafter save one, and hard frost continued up to the 6th of September.

The barley and oats had matured before these heavy frosts, but the wheat suffered. With eight or ten days' more favorable weather the wheats would have matured fully.

Comparing notes with last year, the minimum for July was 38° F.; August, 28° F.; with no killing frost up to September 15. Under these conditions every variety of wheat would have matured and been in the sack before September 15.

Barley and oats have matured at Copper Center every year since 1900, and while wheat had not been planted up to this year I saw one head last season which, having escaped the loose stock on the trail, matured plump, hard grain.

NOTES ON FIELD CROPS.

Barley.—Trooper 6-rowed, seeded broadcast May 20. Surface soil dry and no rain until June 1. Coming up June 5. Stand good. Growth slow and rather poor. June 25, 9 inches high; a little irregular in growth. July 15, 16 inches high and heading. July 20, a few heads of smut appeared. August 10, 2 feet high. August 24, fairly matured or past danger of frost. The heads were small, but well filled. A small plat was seeded May 22 in drills on moist soil. Came up in 10 days. In full head stood 3 feet high, and heads good size, well filled, and matured by August 27.

Sisolsk, seeded May 20. Coming up June 5. Stand good. Growth rather poor. June 25, 8 inches high. July 15, 15 inches high and heading. July 20, about all headed out. Growth very irregular. August 10, 2 feet high and straw turning. August 25, well matured and grain quite hard. On the portion of this plat where a brush heap

FIG. 1.—ALASKA STATIONS—FIELD OF RIPE MANSHURY BARLEY AT COPPER CENTER STATION.

FIG. 2.—ALASKA STATIONS—CUTTING RIPE MANSHURY BARLEY WITH MOWER AT COPPER CENTER STATION.

had been burned the grain made a rank growth, standing 3 feet high when ripe. Matured the same time, heads good size and heavy.

Royal, seeded May 20. Coming up June 5. Stand good. On one half the plat the growth was poor, the other half good. June 25, 8 inches high. July 15, 18 inches high and signs of heading. August 10, 3 feet high and straw turning and grain passing into the dough. August 25, the greater portion had matured or safe from frost. August 27, frost injured portions not quite matured. This variety was next to the last to ripen.

Finnish, seeded May 20. Coming up June 5. Stand good. Growth rather poor on the greater portion of the plat, but where a brush heap had been burned the grain stooled well and made a very rank growth. June 25, 14 inches high. July 15, 2 feet high. July 25, well headed out and nearly 4 feet high. August 10, straw yellow and grain in dough. August 25, well matured and grain quite hard. One of the first varieties to ripen. Heads large and heavy. The same in drills did no better.

Manshury, seeded May 20. Coming up June 6. Stand good. June 25, 13 inches high. July 15, nearly 2 feet high and heading. August 10, 3½ feet high and grain in the dough; straw turning. August 25, grain quite hard and well matured. Heads good size and well filled. One of the first varieties to ripen. This variety stooled very well, 6 heads from kernel not uncommon. (Pl. VII, figs. 1 and 2.)

Lapland, seeded May 20. Coming up June 7. Stand good. June 25, 13 inches high on better portions of the plat. This variety, as all others, made much better growth wherever brush or logs had been burned in heaps. July 15, 2½ feet high and heading. August 10, 3½ feet high, straw turning, and grain in the dough. August 25, grain quite hard and well matured. Heads large and well filled. This was one of the earliest varieties to mature. The Lapland, Manshury, and Finnish may be highly recommended for the Copper River Valley. All of these stooled well, 5 to 7 heads to a single kernel not uncommon.

No. 9133, two-rowed, seeded May 20. Coming up June 7. Stand good; growth poor. No brush burned on this plat. June 25, 6 inches high. July 20, 15 inches high and heading. Stooled very little. August 10, 20 inches to 2 feet high, and grain in milk. August 25, portions of the grain fully matured. Heads fair size and well filled. This variety was about the last to mature, and killing frost August 27 injured portions yet unmatured. A small plat seeded May 22 in drills by hand made better growth, but had not matured when killing frost came, August 27.

Black Hulless, seeded May 20. Coming up June 6. Stand good. Growth rather poor. Stooled a little. No ash heap on this plat. July 15, 16 inches high and beginning to head. August 10, 2 to 2½ feet high. Heads small, but grain large and in dough. August 25,

grain hardened and safe from frost. Matured fully. A small plat drilled by hand May 22 made better growth and much larger heads, but only about half of this plat had matured August 27, when killing frost came and damaged the remainder of the crop. The large plat all matured. The small plat stooled well, 5 to 7 heads to the plant.

Oats.—Sixty Day, seeded broadcast May 20, as the barley. Coming up June 5. Stand good. Growth very good on portions of the plat where brush was burned. Rather poor elsewhere. July 1, 12 inches high. July 15, 20 inches high and heading. August 10, the best stood 3 feet high, heads well filled, and grain in the milk. August 25, grain matured and hard; yield good. (Pl. VIII, fig. 2.)

No. 2800 (from Russia), seeded May 20. Coming up June 7. Stand only fair. Growth poor. No brush burned on this plat. July 1, 9 inches high. July 15, 18 inches high and heading. August 10, the best was 2½ feet high and grain half formed. August 25, the greater portion still green and grain in the dough. When killing frost came, August 27, portions of the grain was yet soft enough to be frozen, but the greater part matured. This variety was the last to ripen.

Nameless Beauty, seeded May 20. Coming up June 6. Stand good. Growth rather poor. No brush burned on this plat. Stooled very little. July 1, 8 inches high. July 15, 18 inches high and heading. August 10, best portion 2½ feet high and grain nearly out of the milk. August 25, grain nearly hard and straw quite yellow. Matured fully.

Finnish Black, seeded May 20. Coming up June 6. Stand good. July 1, 14 inches high. July 15, 2 feet high and heading. August 10, on all portions of the plat where brush had been burned the oats stood 3½ to 4 feet high, and long, heavy heads. August 25, grain well matured and heads hard.

Burt Extra Early, seeded May 20. Coming up June 6. Stand good. July 1, 14 inches high. July 15, 20 inches high and heading. August 10, the best 3 feet high. August 25, matured and grain quite hard.

Swedish Select, seeded May 20. Coming up June 5. Stand good. Growth poor. July 1, 6 inches high. July 15, 12 inches high. Not heading. Two or three small spots, evidently where stumps had been burned, did much better. July 15, 20 inches high and well stooled. Not yet heading. August 10, 3½ feet high. Had headed out well. August 25, grain pretty well matured. Next to the last to mature.

Of all the oats, Sixty Day and Finnish Black did the best.

Wheat.—Ladoga Spring, seeded May 20. Coming up June 5. Stand good. Growth rather poor, except where brush had been burned. June 25, 12 inches high. July 15, 20 inches high. Heading July 20. August 10, 3 feet high and some patches over 4 feet high; heads large and well filled. August 25, grain nearly out of the dough. August 27, heavy frost damaged, preventing the grain from thoroughly

maturing. The straw ripened well, but the grain shriveled and the germ was killed. This variety stooled out well.

Roumanian, seeded May 20. Coming up June 5. Stand good. Growth poor, except on brush-burned portions. Here the growth was rank and stooled well. June 25, 14 inches high. July 15, 2 feet high and heading. August 10, 3½ feet high; grain half formed. Poorer portions stood 2 feet high and about the same stage. August 25, grain nearly past the dough and straw yellow. August 27, frost damaged, killing the germ and causing the grain to shrivel. This variety was almost beyond danger and the furthest advanced of all varieties grown.

Kubanka Spring, seeded May 20. Coming up June 5. Stand good. June 25, 12 inches high where brush had been burned. July 20, 2 feet high and heading. Other portions 15 inches high and heading. August 10, the best stood 4 feet high, well headed and grain over half formed; heads large. The poorest stood 2 to 3 feet high; heads small. August 25, grain well in the dough and kernel large; straw quite yellow. August 27, frost injured, killing the germ and causing the grain to shrivel. The straw ripened fully by September 10.

Russian Spring No. 2955, seeded May 20. Coming up June 6, stand rather poor. July 1, 8 inches high. July 15, 12 inches high. Begun heading July 20. August 10, the best 3 feet high and blossoming. August 25, in the dough; straw quite green. August 27, frost injured, grain shriveled. The straw ripened by September 10.

Pererodka Spring, seeded May 20. Coming up June 5, stand medium, growth poor generally, but on brush-burned portions good. July 1, 10 to 18 inches high. July 20. the best stood 2 feet high and heading. It stooled well. August 10, 4 feet high and blossoming; heads large. Other portions 3 feet high and heads smaller. August 25, grain in the dough and straw turning fast; grain large. August 27, frost injured, killing the germ and causing grain to shrivel; straw fully ripe by September 10.

Russian (Orenburg) Spring, seeded May 20. Coming up June 5, stand good. Growth poor except where brush had been burned. July 1, 9 to 15 inches high. July 15, the poor stood 15 inches high, the best 2 feet. Begun heading about July 20. August 10, the best 4 feet high; stooled well and heads large. August 25, in the dough and straw turning fast. August 27, frost injured, causing the grain to shrivel.

Romanow (imported seed), seeded May 20. Coming up June 5, stand very good. No brush burned on this plat. July 1, 10 inches high. July 15, 12 to 16 inches high and begun heading. August 10, 2 to 3 feet high and grain half formed. August 25, well in the dough and straw turning fast. August 27, frost injured; straw ripened by September 10, grain shriveled.

Romanow (Sitka seed), seeded May 20. Coming up June 6. Stand

very good. Like all the grains, this variety made rank growth wherever brush or logs were burned and stooled very good. July 1, 15 inches high. July 20, 20 inches to 2 feet high and heading. August 10, the best stood 3½ feet high, and grain half formed. August 25, grain in the dough and straw quite yellow. August 27, frost injured, causing grain to shrivel. Roumanian, Romanow, and Kubanka seemed the farthest advanced when the killing frost came. Ladoga was the most backward, but had the season been as last year even this would have matured.

All the above grains were seeded broadcast when the surface soil had become dry through spring cultivation, and the seed lay without any signs of germination until a shower came June 1. Could we have had this shower one week earlier our wheats would no doubt have matured before this unusually early frost.

All the winter wheats seeded last fall were winterkilled, or eaten up by the rabbits as the snow left. The winter rye was bitten off into the ground, but each variety survived in some measure, making a growth of from 4 to 6 feet high, but a frost July 12 killed the grain in the blossom. The straw remained quite green at the writing of this report. Spring seeding did no better and matured no seed.

Emmer.—Yaroslav Spring, seeded May 19. Coming up June 5, stand good; growth very good. July 1, 12 inches high. July 20, 20 inches to 2 feet high, and heading. August 10, 3½ to 4 feet high and grain half formed. This plat made quite even growth and stooled out well. August 25, grain in the dough and straw turning fast. August 27, frost injured the grain causing it to shrivel. The straw was quite ripe September 10. (Pl. IX, fig. 2.)

Uba Spring, seeded May 19. Coming up June 5, stand good. Growth good and regular. July 1, 10 inches high. July 20, 18 inches high and heading. August 10, 3 feet high and grain half formed. August 25, grain in the dough and straw turning. August 27, frost damaged the grain badly. The straw ripened pretty well by September 10.

Russian Spelt No. 2789, seeded May 19. Coming up June 6, stand poor. July 1, 6 inches high. July 20, 12 to 15 inches high, and beginning to head. August 10, 2½ feet high and blossoming. August 27, grain not fully formed when frost came; straw yet green.

The emmers were all seeded broadcast in dry surface soil and no signs of germination until rain June 1. Yaroslav and Uba would have matured with a season as last year.

Buckwheat.—Japanese, seeded May 19. Coming up June 5, stand good. July 1, 12 inches high. Growth thrifty and plants branching good, blossoming July 12, when frost killed all the plants.

Finnish, seeded May 19. Coming up June 5, stand very good. July 1, 8 inches high, branching and beginning to blossom. July 12,

FIG 1.—ALASKA STATIONS—SHOCK OF MANSHURY BARLEY AT COPPER CENTER STATION.

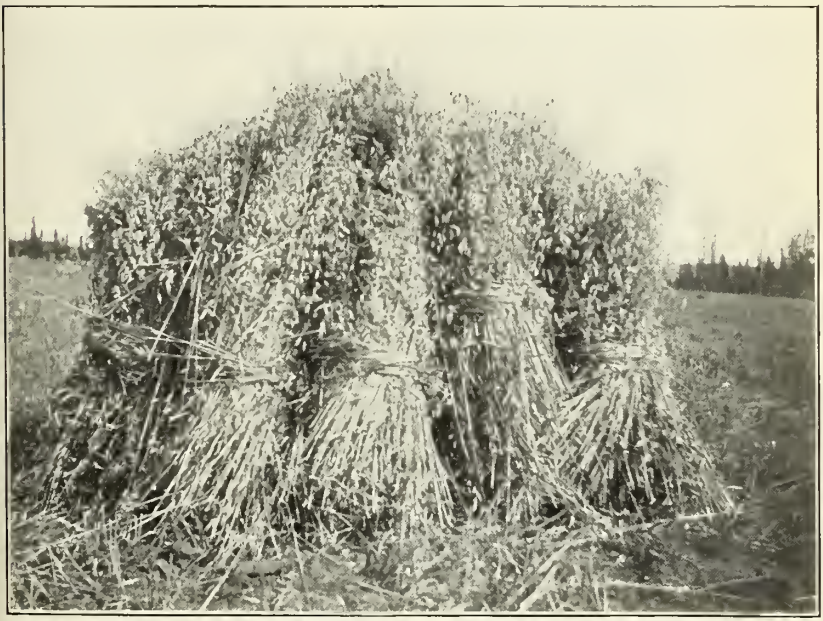

FIG. 2.—ALASKA STATIONS—SHOCK OF SIXTY-DAY OATS AT COPPER CENTER STATION.

FIG. 1.—ALASKA STATIONS—DRILLING WINTER WHEAT AT COPPER CENTER STATION.

FIG. 2.—ALASKA STATIONS—YAROSLAV EMMER NEARLY RIPE AT COPPER CENTER STATION.

frost cut the plants back. Some low branches escaped and continued to grow and blossomed. July 20, 10 to 15 inches high. August 10, some seed had formed and in the milk. This was thoroughly matured by August 20.

Silver Hull, seeded May 19. In hand drills on soil spaded up last year. Came up in 14 days, stand good. This variety matured good seed and a fair yield. The plants stood 2½ feet high and quite well branched out. It was seeded on higher ground than the other varieties and seemed to escape the frost of July 12.

Flax.—A large patch was seeded broadcast May 20. Came up June 7; a little thin on the ground. July 20, 20 inches high and blossoming. August 10, much of the crop stood 30 inches high; seed pods well formed; many flowers continued to appear. The first seed ripened about August 25. Only a small per cent of the seed was ripe at the close of report, September 10.

Peas.—A good-sized patch was seeded broadcast May 20, but the soil being so dry they did not come up until after a rainfall June 1, coming up June 6. July 20, 2½ feet high and blossoming. August 10, pods set and peas half size. August 27, frost injured so much that no seed matured. The vines were cut and fed to a cow as a test for feeding qualities. They were eaten with much relish, and there was a noticeable richness in the flow of milk.

Grasses.—The following grasses were seeded broadcast May 19. The soil on the surface was very dry until June 1, when a rain came. Most varieties germinated quickly after the rain and began to appear above the surface in four or five days. In some instances the seed was not good, but on the whole the plats showed rather a satisfactory growth. The conditions throughout the season were noted as follows:

Timothy made a fine stand; a little uneven in growth. July 20, 8 inches in growth and ground pretty well hidden. August 10, 24 to 30 inches tall and well headed out. September 10, still very green and a good sod formed. No seed had formed.

Redtop made a very slow growth, but a good stand. July 20, 6 inches growth and ground pretty well covered. By August 1 it had begun heading, 10 to 11 inches high. August 10, 13 to 18 inches high. September 10, still quite green and had formed a very good sod. No seed had formed.

Orchard grass made an excellent stand, and well set by July 20; 4 to 6 inches growth and the ground well covered. August 10, showed very little difference in growth, but looked thrifty. September 10, looking a little yellow and no signs of heading.

Meadow foxtail made a very slow growth; stand rather poor. July 20, 3 to 6 inches growth. August 10, a very little change in growth and appearance. September 10, still about the same. It did not make any stems.

Blue grass made a slow growth and poor stand. July 20, 2 to 4 inches growth. August 10, 8 to 12 inches high; had thrown out a few stems, and heading. September 10, still green, but no more growth. No seed had formed.

Tall meadow-oat grass made a splendid stand. July 20, stood 12 inches high; ground well covered. August 10, 8 to 22 inches high and heading. September 10, still green; chaff matured, but no seed formed.

Tall meadow fescue made a slow growth at first. July 20, 4 to 9 inches growth and the ground well covered. August 10, some stems were thrown out and headed, standing 30 inches high. September 10, the grass was still green; the chaff matured, but no seed formed.

Smooth brome grass made a splendid stand. July 20, 6 to 12 inches tall; rank growth, thoroughly covering the ground. August 10, 20 to 24 inches tall and beginning to head. Before the next observations were taken some stock broke into the field and ate the tops off nearly the whole plat. However, a few stalks headed, standing 3 feet high, but still green September 10.

Perennial rye grass made a very good stand. July 20, 8 to 10 inches high and thoroughly matted. August 10, some heads appeared, standing 12 to 15 inches high, and growth even more matted together. Before the next observations were made some stock that broke into the field ate this plat off close to the ground, and a new growth seemed to be starting September 10.

Red clover and alsike clover were likewise seeded near the above grasses. The alsike clover made a light and rather unsatisfactory growth, but still green September 10; slightly frosted. The red clover made much better growth. It made a good stand. July 15, 4 to 6 inches growth, pretty well covering the ground. August 10, 12 inches high and a few blossoms appeared. September 10, still green, but slightly frosted. No seed formed. I found some plants along the military trail 18 to 20 inches high, stalks thrifty, and in blossom by the end of July.

Dwarf Essex rape seeded May 19, broadcast; stand good. Frost injured July 12. The plants then covered the ground, but making a poor growth, standing 6 to 10 inches high. August 1, some stalks on brush-burned soil, uninjured by frost, stood 15 to 18 inches high; leaves 8 to 9 inches across. It did not seem to grow much after this time.

VEGETABLES.

Most of the common, hardy vegetables were grown at the station this year; but the ground being new and with only 4.31 inches rainfall from May 1 to the end of the growing season, the results were, in part, rather unsatisfactory. The varieties grown were enumerated as follows:

Cabbage (Early Jersey Wakefield), *cauliflower* (Early Snowball), and *tomatoes* (Livingston Perfection).—These were seeded in boxes and

planted on a temporary hotbed the first week in May, which was late, of course, but unavoidable, owing to my being absent from the station at the proper time for seeding the same. These were transplanted to the garden June 15, and while none came to any good the cabbage had begun to head by the end of August. The cauliflower showed no sign of heading. The tomatoes were growing finely when killed by frost, July 12.

Peas.—Little Gem and Earliest of All. These were seeded in drills 18 inches apart May 14, and both gave good results. Earliest of All came up in 12 days, and the first blossoms appeared June 25, 42 days from seeding. Pods were setting by June 30, and the peas were ready for table use by July 18, 65 days from seeding.

Little Gem began to blossom July 10, 57 days from seeding. Pods were setting July 20, and the peas were ready for table use by August 10, 88 days from seeding.

Lettuce.—White Winter Cabbage, Big Boston, and Early Curled Silicia were seeded in drills 12 inches apart May 14. The surface soil was very dry, but most of the seed germinated, coming up in 9 to 16 days. White Winter Cabbage seed was poor; only about 10 per cent grew. This variety was ready for table use July 1. Big Boston variety was ready for table use June 28. It made a thrifty growth; lettuce crisp and delicious. The plants attained a very large size by midsummer. Early Curled Silicia variety was ready for table use June 28. It made a thrifty growth; lettuce crisp and delicious, and preferable to all other varieties grown on the station.

Onions.—Extra Early Red and Australian Brown were seeded May 14, coming up in 12 to 17 days. Only about 10 per cent of the seed germinated. The soil was very dry, and not rain sufficient to give them a fair test. By fall they had only attained the size of large marbles. The Early Red did the best. A quart of sets had been mailed to me at Valdez during the early winter and then were frozen as I carried them in over the snow and ice, so that only a few sets grew. These only made a fair size, but quite fit for table use. They were pulled and laid away September 10. The tops were then dry.

Garlic.—Three bulbs accompanied the onion sets and were set out the same time, but none started.

Radish.—Early Scarlet Turnip and Early Long Scarlet were seeded May 14. The former was ready for table use June 26, then the size of walnuts. They were sweet and crisp. The latter did very well; ready for use a few days later.

Carrots.—Guerande, or Ox Heart, and Early Scarlet Horn. The season kept too dry for these as well as all the vegetables. The carrots did only fair, making roots 1 to 1½ inches in diameter. Very little noticeable difference in the varieties.

Turnips.—Early Flat White Dutch, Extra Early White Milan, and

Purple Top Strap Leaf were seeded May 14. They came up in 7 to 10 days, and all made about the same growth. The roots were a little small, but crisp and juicy, and certainly very fine.

Ruta-baga.—Yellow Swede, seeded May 14, came up in 7 days. It made good-sized roots, sweet and crisp.

Parsnips.—Large White Dutch, or Sugar, seeded May 14 and 22, came up in 12 to 16 days. It made roots about 1 inch in diameter, and roots run deep.

Beets.—Golden Tankard and Dark-Red Egyptian Turnip, seeded May 14 and 25, came up in 11 to 14 days. The first variety mentioned made a thrifty top growth, and some beet roots measured 2½ inches in diameter. Egyptian Turnip did only fairly well, the best beet roots measuring 2 inches in diameter. These, when prepared for the table, were eaten with a relish.

Rhubarb.—Victoria, seeded May 14 and 23, came up in about 22 days. Only a few seeds grew. These only made small plants this year.

Beans.—Detroit Wax and Windsor, seeded May 14. Each variety came up in about 22 days. A frost July 12 killed the Detroit Wax and injured the Windsor slightly. The latter remained green and formed a few pods. These were late in filling, and frosted August 27. No seed matured.

Chervil.—Curled; seeded May 23; none grew.

Kale.—Dwarf Curled Scotch, seeded May 14 and 23, came up in 9 to 15 days. It was large enough for table use July 5.

Cress.—Curled or Pepper Grass, seeded May 14 and 23, came up in 7 to 10 days. It made a good growth, and was ready for table use by June 30. It made stems over 2 feet tall and ripened a heavy crop of seed.

Potatoes.—We can not say much on this subject as yet. The great problem is to get seed here in time for planting. Arrangements were made with James Fish, at Valdez, to send us one horse load of seed last spring, but by the time horses could be taken over the summit it was too late and the seed was not sent. However, a Mr. Holman paid a prospector $5 for packing 3 pounds of potato eyes to Mr. Blix, his partner at Copper Center. One-half of these were given to us to plant at the station. These were planted after the middle of June, and only 4 eyes grew. They came up about July 1 to 5, and made quite a good growth. Frost killed the vines August 27. At that time the tops were about 9 inches high and the tubers the size of large hen's eggs. I found as high as seven of these, with some small ones, to a single hill.

It is very evident that as the ground becomes older settlers can raise vegetables for home use without difficulty, and with irrigation they can grow vegetables of the finest order.

FIG. 1.—ALASKA STATIONS—BREAKING NEWLY CLEARED LAND AT KENAI STATION.

FIG. 2.—ALASKA STATIONS—GRAIN GROWN IN 1903 AT RAMPART, LATITUDE 65° N.

FIG. 1.—ALASKA STATIONS—PATCH OF BUCKWHEAT IN BLOOM AT KENAI STATION.

FIG. 2.—ALASKA STATIONS—FIELD OF BURT EXTRA EARLY OATS AT KENAI STATION.

Among our present needs I will recommend as much needed at this station a good hay rake and at least 10 bales of barbed wire. The latter is a serious need to protect our crops. The ordinary pole fence does not turn the stock once they get a taste of the fine oats and various grains growing at the station.

Respectfully submitted.

J. W. Neal,
Superintendent Copper Center Experiment Station.

Prof. C. C. Georgeson,
Special Agent in Charge of Alaska Investigations.

KENAI STATION.

On returning to Valdez from the interior I took the first boat bound for Cook Inlet, which happened to be the *Newport*. She left Valdez August 11 and arrived at Seldovia on the 13th. The little flat-bottomed steamer *Tyonic* was in waiting and left the same night for the ports in the north of the inlet, and arrived at Kenai the next morning.

I found Mr. Nielsen and Mr. Ross engaged in breaking new ground. (Pl. X, fig. 1.) There are now at the station 21 acres cleared, broken, and fenced. The first 5 acres were cleared immediately back of the village, but it was found that the winds from the sea, which swept in unobstructed, damaged the crops. The next 16 acres were therefore cleared some little distance back in the woods so as to leave a shelter belt of timber to protect the crops from the sea winds. This has been found to be an advantage, but it is believed that still better protection will be afforded farther back, and the next field to be cleared has been chosen with this end in view.

In the middle of August, when the writer was there, the crops looked well and gave promise of a plentiful harvest. (Pl. XI.) But the promise was not fulfilled. It will be seen from Mr. Nielsen's report, submitted herewith, that none of the grain matured this year. Heretofore the earlier varieties of grain have matured, but this year was an exception in this respect. The spring was late and the summer averaged colder than in previous years. There was less sunshine than usual, with a great deal of misty, overcast weather. The number of clear days was as follows, by months: May, 9; June, 6; July, 12; August, 10. But whatever the cause, the fact remains that grain failed to mature. Of the five years during which we have been at work on this station this is the only total failure to mature grain. From the data now at hand it is evident that grain growing for the seed is uncertain along the coast on the Kenai Peninsula. But there is reason to believe that grain can be matured some 10 or more miles from the coast where the influence of the winds and mists from the inlet are less sinister.

STOCK RAISING A SUCCESS.

But there is no doubt in regard to stock raising. The station work oxen have now been kept for five years, winter and summer, wholly on native-grown feed—grass in summer and hay or silage in winter—and they have been kept in sufficiently good condition for work. We have also made a start in keeping cows.

Cattle have been kept at Kenai and Ninilchick for many years. The native stock is a diminutive Siberian breed, but at Kenai they have been improved by the introduction of American cattle, and the two cows owned by the station at this writing are of average size. That live stock can be grown there has been proved, and I therefore recommend that hereafter special attention be given to animal industry at this station. If the money is available I recommend the building up of a small dairy herd and that a dairy equipment be provided. This, however, should not be done if it will in any way retard the development of the stations in the Copper River Valley and at Rampart on the Yukon, for I consider that these stations are of more immediate importance than the Kenai Station. But provided that these stations do not suffer, the work of clearing and improving land at Kenai should continue, and a small herd of general-purpose cattle should be collected there with a view to inaugurate dairy work when the necessary equipment can be provided. Nowhere in Alaska has butter or cheese been manufactured, and it will be an instructive and profitable experiment to ascertain what cattle raised on native feed can produce in this line.

A CHANGE IN SUPERINTENDENT.

Mr. H. P. Nielsen, who has been superintendent of this station since the breaking of the first sod in the spring of 1899, has resigned, and Mr. P. H. Ross, a graduate of the Kansas State Agricultural College, has taken his place. Mr. Nielsen has been an energetic and industrious worker, and most of the hard work of clearing the land has been done by him. He has erected all of the buildings and laid the foundations of the station, from which much usefulness in the future may be expected. Mr. Nielsen's report follows herewith:

REPORT OF H. P. NIELSEN, SUPERINTENDENT OF KENAI STATION.

KENAI, ALASKA, *October 14, 1903.*

DEAR SIR: I herewith submit report on work for the season of 1903.

CLEARING OF NEW LAND.

In addition to work with experimental crops on the 15 acres previously cleared and broken we have cleared of trees, stumps, and brush,

and broken 6 acres more and fenced it. For convenience the field by the house is designated in this report as Field A; the field back in the woods, Field B.

GENERAL IMPROVEMENTS AND ADDITIONS.

Last year I purchased a building of the Alaska Packers Association which had been used for quarters for Chinamen while the cannery here was in operation. The object was to tear the house down and with the lumber build a barn for implements and grain. The building as it stood measured 75 by 24 by 10 feet. I took it down, moved the lumber 2 miles, and built a barn here measuring 64 by 24 by 10 feet; we having some lumber left. The old implement shed is being converted into a stable for horses and cattle. (Pl. XII, figs. 1 and 2.)

Fourteen hens and a cock were bought in August and the old silo building converted into a chicken house.

A 3-year-old cow was bought in August for the station.

One of the oxen brought up here in 1899 died last spring.

Last year a yoke of oxen were shipped here from Portland, Oreg., but one of them had received so severe injuries on the voyage that he died a week after landing.

The station herd now consists of 2 cows, a 16-month-old heifer calf, a 2-year-old steer, and 2 oxen; 6 head in all.

Twelve tons of native grass were cut, cured, and stacked in July and August. About 7 tons of this are now in stack.

Of the orchard set out in the spring of 1902 there are alive 3 apple trees, 1 cherry tree, 7 raspberry bushes, 10 gooseberry bushes, and 1 currant bush.

The apple trees grew very slowly during the summer. The cherry tree grew shoots about 3 feet long, and seems healthy. The raspberries made a remarkable growth from the roots and sent up many new canes, but all of last year's stems were winterkilled, so they did not bear any fruit. The gooseberries grew new stems, 2 to 3 feet long, but did not bear. The currant bush made a normal growth without bearing any fruit. The strawberries, 3 varieties, did remarkably well, and ripened nearly a gallon of berries, but, owing to the birds, there were seldom more than 3 or 4 ripe berries to be found at a time. New plants were made by the hundred in the latter part of the summer, so the beds will need to be extended next year.

The grain has been hauled off the field, and the portion which was dry enough to stack has been stacked up; the rest is standing in shock in the stack yard. Five acres of the grain field have not yet been plowed this fall.

NOTES ON VEGETABLES.

Potatoes.—Early Rose and Early Burbank were planted May 23. They did not all come up until about July 6, but when once up they

grew rapidly. The yield was not so good as last year, but two-thirds of the Early Rose and one-half of the Burbank were marketable. They were dug September 24.

Success with vegetables this year was not so good as usual, except with cabbage, celery, and parsley. The peas did fairly well, but were late in coming into bearing. The lack of success with the other things was due partly to the cold summer, but mostly to the fact that the soil was new. It was given a liberal dressing of manure last spring, but it did not have time to decay sufficiently to help the plants much this year.

April 27 I planted in the cold frame the following seeds: Cabbage, Jersey Wakefield; cauliflower, Early Snowball and Dwarf Erfurt; lettuce, Big Boston and Morse; kohl-rabi, Large White; broccoli, Mammoth White; cucumber, White Spine; celery, Improved White Plume; onions, Yellow Globe Danvers; parsley, Plain Single; and Brussels sprouts.

The cabbage was set out in the open June 3 and did very well. Less than 1 per cent of the plants set out failed to grow and most of those that grew made good-sized heads. The cabbage last summer was the best I ever raised.

The cauliflower and broccoli plants were set out June 8, but did not amount to anything. The plants kept green all summer, but they did not begin to grow well until in August, and the frost killed them before they came to head.

The kohl-rabi plants were set out June 3 and did fairly well

A few plants of both varieties of lettuce were set out June 8, but they did not develop to large heads.

The cucumbers did not get large enough to transplant. I do not think cucumbers can be raised here. I have tried them five years now without success.

I had no ground prepared rich enough in which to transplant celery. I therefore took out the other plants and transplanted the celery to the cold frame, and it grew magnificently. Of course, I did not have room to bank it up, but some of the plants grew 15 inches high, and as they stood so closely they partly bleached without banking. It is finely flavored and tender.

The onions were left in the cold frame and the largest bulbs attained a size of 1 inch in diameter.

The parsley was also left in the cold frame and grew to be 1 foot high.

On May 19 I planted the following varieties of peas: American Wonder, Hosford Market Garden, Earliest of All or Alaska, and Thorburn Extra Early Market. There was no noticeable difference as to earliness, for they were all late. They were not eatable until about the 1st of September. Hosford Market Garden grew the largest vine, it being about 3 feet tall.

FIG. 1.—ALASKA STATIONS—STATION BUILDINGS AT KENAI STATION.

FIG. 2.—ALASKA STATIONS—NEW BARN AT KENAI STATION.

On May 20 I planted beets, Early Egyptian; carrots, Early Scarlet Horn; parsnips, Hollow Crown; corn salad; and ruta-baga, Large White.

The beet, carrot, and parsnip seed were soaked in water over night, but they did not come up until about five weeks after planting. The beets amounted to nothing. The carrots were small, largest roots being only 1 inch in diameter and 2 and 2½ inches long. The parsnips did not do so well. The corn salad came up in about three weeks, but grew very slowly. It is green at the present time, but only 2 inches high, and has not been picked. The ruta-bagas came up in about two weeks, but did not get very large; a few of the largest weighed 1 pound a piece. They needed richer ground.

On May 28 I planted mustard, White London; garden cress; spinach, Savoy; kale, Siberian; and radishes, Early Scarlet and French Breakfast. The mustard did not get large, neither did the cress. The spinach went to seed without making many leaves. The kale grew well; some of the leaves were 14 inches long, and the plants stood quite thick in the rows. The radishes did fairly well, but were a long time attaining an eatable size.

Turnip (White Dutch) was sowed broadcast June 10, and the seed covered by raking the ground over with the garden rake. They did fairly well, but none of them became exceptionally large.

FIELD CROPS.

Winter grain.—Giant Winter Rye seeded August 25, 1902. September 3 there was a fine stand 3 inches high. October 1 it was 6 inches high and spreading out. It wintered over in good shape, and on July 1, 1903, there was a good stand, 3 feet high, fully headed. July 15 it was 5½ feet high. August 1, 6 feet high and just going out of bloom. August 19, 6 to 7 feet high, filling out nicely and promised well. September 1, ripening and grain in the dough. September 15, grain injured by the frost. The chaff and straw were ripe, but the seed would not harden. It was cut September 21. The grain is not mature enough to make seed.

Excelsior winter rye, seeded at the same time and in the same kind of ground as the above variety. Growth and results the same as the above.

Two other varieties of rye (Schlansted and Fechitin) were sown, but the seed failed to grow.

A plat each of Excelsior winter wheat and Giant winter rye was sown August 18 last. At the present time the plats are green and look very promising.

SPRING CROPS.

Wheat—Romanow.—Two plats were seeded, one in Field A, May 26, and one in Field B, June 4. On June 6 the plat seeded May 26 was coming up. The plat seeded June 4 was coming up June 14. On July 1 it was noted in Field A, stand excellent, 4 inches high. In Field B, stand excellent, 5 to 6 inches high. July 15, in Field A, growth spindling, 6 to 8 inches high; in Field B, 8 inches high. August 1, in Field A, 1 foot high; in Field B, 18 inches high. August 19, in Field A, 24 to 30 inches high and beginning to bloom; in Field B, 36 inches high and in bloom. September 1, in Field A, 30 to 36 inches high, in bloom; in Field B, 4½ feet high, in bloom. September 15, in Field A, 42 to 48 inches high, still in bloom. It will make no grain. In Field B, 5 to 6 feet high and still blooming. Both plats were cut September 22, the straw to be used for hay.

Barley—Manshury, seeded May 28. June 6, was just showing above ground. July 1, stand excellent, 3 to 4 inches high. July 15, 4 to 6 inches high. August 1, 12 to 20 inches high and beginning to head. August 19, 30 to 40 inches high and in bloom. September 1, passing from milk to dough, 3 to 4 feet high. September 15, about 30 per cent still in the milk; rest in the dough; straw still green. When cut, September 29, a small percentage of the straw turning yellow, mostly green. Grain spoiled by the heavy frosts of September 23, 24, 26, 27, and 28. No seed ripe.

Oats—Sixty Day.—Two plats of this oats were sown, one in Field A, May 26, which was just coming up June 6. The other plat was sown in Field B June 4. July 1 the stand was good, 3 inches high in both fields. July 15, in Field A, 6 inches high; in Field B, 7 inches high. August 1, in Field A, 12 inches high, 10 per cent headed; in Field B, 14 inches high, but no heads yet. August 19, in Field A, 30 inches high and in bloom; in Field B, 36 inches high and in bloom. September 1, in Field A, some in bloom, some just past; in Field B, 4 feet high and in bloom. September 15, in Field A, 36 to 42 inches high, grain in milk and dough, a few hulls turning yellow, straw green yet, beginning to lodge badly; in Field B, 4 feet high, badly lodged, grain in the milk, straw green. The plat in Field B was cut for hay September 23, no grain ripe. The plat in Field A was cut September 28, no grain ripe.

Swedish Select.—Two plats were seeded with this variety, one in Field A, May 26, and one in Field B, June 4. The plat seeded May 26 was just showing above ground June 6. The plat seeded June 4 was coming up June 12. July 1, in Field A, stand good, 3 inches high; in Field B, stand excellent, 3 inches high. July 15, in Field A, 4 to 6 inches high; in Field B, 8 inches high. August 1, in Field A, 12 to 14 inches high; in Field B, 20 inches high. August 19, in Field

A, 30 inches high, in bloom; in Field B, 36 inches high, just headed out. September 1, in Field A, just past bloom, 3 feet high; in Field B, 5 feet high, in bloom. September 15, in Field A, 42 to 48 inches high, some spots 5 feet high, grain in the milk and still growing, color dark green; in Field B, what is standing is 5 to 6 feet high, 75 per cent of it flat on the ground from the recent storm, grain in the milk, color dark green. Both plats were cut September 23. As there was no ripe grain it will be used for hay.

Common field oats seeded June 15. July 1 there was an excellent stand, 2 inches high. July 15 it was 3 inches high. August 1, 8 inches high. August 19, average height 16 inches, beginning to head. September 1, 30 inches high, about 90 per cent headed. September 15, 36 to 42 inches high, fully headed, about 20 per cent in bloom. It was cut for hay September 26 and 27. No grain whatever in the heads.

Two acres was sown to Burt Extra Early oats with seed raised here in 1902, but it failed to make a stand.

Buckwheat.—Orenburg, seeded May 26. July 1, stand excellent, 1 to 2 inches high. July 14, 2 to 4 inches high, beginning to bloom. August 1, 8 to 12 inches high, in full bloom. August 19, 12 to 18 inches high, in full bloom, some seed formed. September 1, killed by frost, no seed ripe. It was cut September 10.

GRASSES.

On July 1 notes were taken. Grasses seeded in the spring of 1902, as follows:

Dactylis glomerata.—Leaves 6 inches in height, a few seed stalks headed out, 20 to 24 inches high.

Agrostis vulgaris.—1 foot high, heading out.

Lolium perenne.—Winterkilled.

Bromus inermis.—16 inches high, fine stand.

Poa pratensis.—1 foot high, heading out.

Festuca elatior.—Growth spotted, 6 to 20 inches high, no heads yet.

Avena elatior.—Winterkilled.

Phleum pratense.—12 to 16 inches high, just showing a few heads.

Alopecurus pratensis.—30 inches high, fully headed, and in bloom.

These plats were all mowed for hay July 6. A second crop of hay was mowed September 10. Yield somewhat smaller.

On June 1 and June 2, 1903, a small plat each of the following grasses and forage plants were seeded: *Bromus inermis*, *Dactylis glomerata*, *Lathyrus sylvestris*, *Aira cæspitosa*, *Polygonum sachalinense*, *Ulex europæus*, *Avena elatior*, *Alopecurus pratensis*, white clover, red clover, alsike clover, *Phleum pratense*, *Lolium perenne*, *Festuca elatior*, *Poa pratensis*, and *Poa aquatica*.

Of these varieties, *Aira cæspitosa*, *Polygonum sachalinense*, and *Poa aquatica* failed to grow.

Bromus inermis.—July 1, stand was good; 1 to 3 inches high. July 15, 3 to 4 inches high. August 1, 4 to 5 inches high. August 19, 6 to 8 inches high. September 15, 12 to 15 inches high. This plat has been pastured, but is still green.

Dactylis glomerata.—July 1, just up. July 15, stand good, 1½ to 2 inches high. August 1, 5 inches high. August 19, 6 to 8 inches high. September 1, 8 to 12 inches high. Pastured the last week. Growth has ceased, but plat still green.

Lathyrus sylvestris.—September 1, just coming up. September 15, stand good, 2 inches high. October 10, 3 inches high; plants green, but growth stopped.

Ulex europæus.—July 15, stand uncertain, just showing above ground. August 1, just coming up. August 19, stand good, 2 inches high. September 1, 4 to 5 inches high. No progress.

Avena elatior.—July 1, stand fine, 1½ inches high. July 15, 2 to 4 inches high. August 1, 8 to 10 inches high. August 19, average height 16 inches; beginning to head. September 1, 18 inches high; fully headed. It was about 2 feet high on September 15, when it was mowed for hay. The stubble started growing at once. Plat still green.

Alopecurus pratensis.—July 1, stand uncertain, just coming up. July 15, stand good, 1 inch high. August 1, 2 to 3 inches high. August 19, 4 inches high. September 1, 5 to 6 inches high. September 15, a few seed stalks 24 inches high; body of grass 6 to 8 inches high. Plat still green.

White clover.—July 1, just coming up. July 15, stand good, ½ inch high. August 1, 1 inch high. August 19, 3 to 5 inches high. September 1, 4 to 6 inches high. September 15, 6 to 8 inches high. September 17, cut, and with the other 2 varieties of clover used for silage.

Red clover.—July 1, fine stand, 1 inch high. July 15, 1½ to 2 inches high. August 19, 4 to 6 inches high. September 1, 6 to 8 inches high. September 15, 8 to 10 inches high. Cut for silage September 17.

Alsike clover.—July 1, just coming up. July 15, stand good, ½ inch high. August 1, 1 to 2 inches high. August 19, 4 to 6 inches high. September 1, 6 to 8 inches high. September 15, 8 to 10 inches high. Cut for silage September 17.

Phleum pratense.—July 1, just coming up. July 15, stand good, 1 inch high. August 1, 2 to 3 inches high. August 19, average height, 6 inches. September 1, 8 inches; beginning to head. September 15, growth spotted, 10 to 18 inches high; fully headed; earliest heads in bloom.

Lolium perenne.—July 1, good stand, 2 inches high. July 15, 3 inches high. August 1, 4 to 5 inches high. August 19, 5 to 6

inches high. September 1, 8 to 10 inches high; spreading out. September 15, same as before. October 10, plat still green, although the cattle have pastured it close.

Festuca elatior.—July 1, just coming up. July 15, 1 to 1½ inches high. August 1, 2 inches high. August 19, 4 inches high. September 1, 6 inches high. September 15, 6 inches high.

Agrostis vulgaris.—July 15, good stand, 1 inch high. August 1, 2 inches high. August 19, 6 inches high. September 1, 8 to 10 inches high. September 15, 10 to 12 inches high. The cattle have eaten this plat off quite close.

Poa pratensis.—July 15, stand uncertain; just coming up. August 1, 1 inch high: stand uncertain. August 15, uncertain. September 1, smothered by weeds.

Rape.—Seeded June 1. July 1, just up; stand good. July 15, 2 to 4 inches high. August 1, 6 to 10 inches high. August 19, 12 to 18 inches high. September 1, 18 inches high; flower stalks appearing. September 15, just beginning to bloom. Cut for hay about 2 feet high.

Hemp.—Seeded June 1. July 1, just up; stand uncertain; 1 inch high. July 15, stand uncertain, 2 inches high. August 1, 3 to 6 inches high. August 19, 6 to 12 inches high. September 1, 1 to 2 feet high; no blossoms yet; will not make anything. September 15, 1 to 3 feet high; making buds; no blossoms yet. Cut down September 21. A total failure.

Respectfully submitted.

H. P. Nielsen, *Superintendent.*

Prof. C. C. Georgeson,
Special Agent in Charge of Alaska Investigations,
Sitka, Alaska.

RAMPART STATION.

The following grains matured at Rampart again this year. Named in order of their appearance in Plate X, fig. 2, from left to right, they are as follows: Flying Scotchman oats, Manshury barley, Black Finnish oats, Burt Extra Early oats, Romanow spring wheat, and common oats. The Black Finnish oats is a very fine sample. It stands 5 feet high and has a good grain. The Manshury barley is also good. The others are inferior.

As stated elsewhere, the patch of cleared ground has been cultivated by Mr. J. W. Duncan under the direction of the special agent.

I recommend most earnestly that a regular employee be put in charge of the station, and that a team of horses and the necessary farm implements be provided. This should be done as early in the coming season as possible, in order that ground may be prepared for the year following. The equipment and the first year's work will cost $5,000, the cost of transportation and freight being perhaps the heaviest items.

REPORT OF REV. C. P. COE ON COOPERATIVE EXPERIMENTS AT WOOD ISLAND.

WOOD ISLAND, KADIAK, ALASKA, *September 11, 1903.*

DEAR SIR: I have the honor to submit herewith the report of the agricultural work and experiments for this present year. Owing to your request to have the report early, I am unable to give final and definite results in many cases. The weather has been so unfavorable throughout the season that the results are far from being as favorable as usual. On two days only has the thermometer reached 80° F.

All the land used was treated to a light dressing of fish guano, and all the stable manure obtainable was also used. Some of the most thoroughly decayed vegetation from a marsh was used as a fertilizer on three plats, but without any definite results. It would supply humus, but is very slow in decaying.

FIELD CROPS.

Barley—Beardless.—Seattle seed sown on sandy land April 23, as nurse crop for grasses, vetches, etc., made a slight stand, and has grown to about 18 inches in height. Heads are short, but large in diameter, and seed is large and heavy. It will mature.

Manshury.—Minnesota seed, sown on May 5, on land used one year before, has made a growth of 2½ feet, good straw, moderate, well-filled heads, and will mature.

Manshury.—Home-grown seed, sown on new ground May 11, made good growth of straw and some heads would mature. It will be cut for feed when weather permits.

Buckwheat—Japanese.—Seattle seed. Sown on three plats May 22, 23, and 26. Land was all old; conditions favorable. All plats blossomed, and a few seeds are to be found now, but none would mature.

Corn wheat.—Two plats were sown May 13 in drills, and May 22 broadcast, on old land. The first plat grew straw 4 feet high, and from a distance seemed to have fine heads, but they were all empty. It was cut for hay September 8. The other plat was destroyed by geese.

Flax—Seed from Seattle. Sown May 13, 22, 23, 26, and June 2. Three of these plats have done very nicely and will furnish seed. The stalks are about 16 inches high, and the seed pods are now well filled and the seeds getting hard. The other two plats did no good. This is the first time flax has done so well.

Kale—Thousand Headed.—Sown in wet places, broadcast, and has failed to do any good. Few seeds germinated, and those that did have furnished plants but about 8 inches high now. Last year the success was much better.

Millet—Hungarian.—Sown May 22, 26, and June 2, and has done no good. A few spears may be found 4 or 5 inches high.

Oats.—Several experiments were made with oats. The results were fairly favorable. Oats will be counted one of the most satisfactory crops.

Black Finnish, home-grown seed, sown May 11 on land broken last fall, made a good growth and will be cut for hay.

Swedish Select, Dakota seed, sown May 5 on old land, now stand 2½ feet high, are well headed, and will mature. On new land they were sown May 11 and will be cut for feed.

Thousand to One, home-grown seed, sown May 11, made good growth and will be cut for hay.

Right Side, home-grown seed, sown May 6, stand 3½ feet high, are well headed, and will mature. Sown on new land May 11, the result was the same as other varieties.

Seattle seed oats on new land gave same results.

Sixty Day, Sitka seed, sown May 5, are 2½ feet high, but badly lodged by storms the early part of September. They are well headed and will mature, if not beaten down again by the winds.

Mixed White, home grown, and will also mature. They now stand 3½ feet.

Peas.—White Canadian and Blue Prussian peas were sown with oats for feed. The result was favorable, but the yield was not large, probably 8 tons green feed to the acre. On sandy land they did no good.

Rye.—Experiments with rye were confined to three sowings of Excelsior, three of Giant, and one of Schlonsted seed. Most of these were made in August last year, and two as late as October 3. The straw of the rye was about 5 feet high, but the heads were empty. It was cut for hay in September.

Rape.—Dwarf Essex and Dwarf Victoria were sown in oats May 5. At this writing it is not more than 4 inches high, even where the oats failed. Last year the rape put into the silo rotted.

Spelt.—Home-grown seed was sown May 6. It is 3 feet high and will probably mature.

Vetches.—Both Spring and Sand vetches were sown in barley on sandy land April 23. Some plants have made a growth of 2 feet from the crown, but the stand is poor and will not mature seed.

Wheat.—Experiments were made with Romanow from imported Russian, Sitka, and home-grown seed, all on similar soil. The plats were sown May 5 and 6. The Russian seed made a good stand, and the grain stands about 2½ feet high. The heads are medium length and small; seed may mature. The Sitka seed did better. The grain is 3 feet high, the heads longer and larger, and seed will probably mature. The home-grown seed has made about the same showing as

the Sitka seed. Seed from Seattle on new land grew 3 feet high, and will be cut for hay.

Marvel Spring wheat.—Home-grown seed made a growth of about 3 feet, and has been cut for hay.

GRASSES.

Bromus inermis.—Sown with barley on a sandy field, but has not made any showing. Where sown previously it does not now show.

The grass plats sown last year survived the winter and were cut for hay the first of September. The half acre made about half a ton of hay.

Johnson grass was sown under same conditions as the clover, and a few roots can be found. These are bearing seed.

Timothy.—A plat of timothy sown two years ago is as fine a piece of grass as one could ask to see anywhere. It stands 3 feet high and has long full heads at present. We are saving it for seed. The stalks are well leaved, and the yield would be very satisfactory. Timothy has been used to sow on meadows and pasture lands, and the results have been satisfactory.

CLOVER.

Alfalfa was sown with barley as a nurse crop and made a small stand. Some stalks are 10 inches high. This was on sandy land. The stand is probably not sufficient to justify saving.

Alsike clover has not done well. Neither that sown on sandy land this year nor that sown last year.

Esparsette was sown with barley on sandy soil, but not a stalk can be found.

Crimson clover was sown with barley; nothing to be seen.

Mammoth red clover, under same conditions as alfalfa, has made about the same record.

White clover was sown with timothy on meadow and is showing well.

Wild rice has been sown in the lakes. That sown in the spring has not made any showing, and that sown this fall has not had time to do so.

VEGETABLES.

It is in this part of the work that failure has been met with in greatest measure, and that too with vegetables that have given the best results in previous years. Cabbage, cauliflower, celery, celeriac, and broccoli in several varieties were sown in window boxes and hotbeds as early as March 9 and in the open May 1. Plants were transplanted into cans, and from the cans into the garden May 23, but it is doubtful if we will have one head of cabbage, or more than half dozen heads of cauliflower. Celery, celeriac, and broccoli are no better.

Caraway seed was sown, but has made no showing.

Carrot.—Short Horn germinated poorly, but grew to fair size and were very fine. Half Long Danvers and White Belgian have done nothing; on old land, too.

Chervil planted May 1 and 22 did nothing. Corn salad ditto.

Cress, curled, sown May 1, germinated slowly; seeded quickly.

Water cress was sown along margin of streams, but has not grown well.

Beets.—Early Egyptian, sown May 1, has done as well as beets can be expected to do, better than ever before here. Long Smooth Blood beet, Half Long Blood, Golden Tankard mangle-wurzel, and Mammoth Long Red mangle-wurzel germinated very poorly and have made very little growth.

Dill was sown, but no seed germinated as far as can be seen.

Endive was sown May 1, and but few seeds germinated. Plants that grew went to seed speedily. Another plat sown June 2 is now ready for use. In this seed germinated well.

Beans.—Red Valentine and Six Weeks varieties have grown to about 4 inches in height and have blossomed.

Kale was sown in the open May 1, and at present is ready for use.

Kohl-rabi was sown in open May 1; a few seeds germinated, but are no account.

Lettuce.—Many varieties of lettuce were sown, such as Boston Market, San Francisco Market, Hanson, Deacon, Prize Head, etc. Of these San Francisco Market has proved the only good variety this season. Others did well for a little time, but soon went to seed. The San Francisco Market was sown May 1, and from the time it became ready for use until the present has been improving. From that one seeding we have had lettuce all the summer for our use and for sale, and now there are heads as large as early cabbage, solid and crisp. Few heads have sent up seed stalks.

Leek.—Carenton were sown in hotbed May 10, and set in open May 23, sown in open May 1. Results nothing.

Onions.—Onion sets were planted May 23, but did not do well. We have at no time succeeded in raising onions of any considerable size. May 1, Australian Brown, Prize Taker, and Pink Prize Taker onion seed was sown in the open on old garden plat and at this time we have good bunch onions that are very fine, but they are not more than three-fourths of an inch in diameter. The Prize Taker have given better results than the Australian.

Parsley.—Triple curled was sown in hotbed and May 1 in the open garden. Few seeds germinated. That in the open which did germinate have produced very fine plants.

Peas.—Peas have been next to a failure. A very few times we have been able to gather a sufficient quantity to serve at the table, although

there were a great many planted. The varieties sown were Alaska, First and Best, Scorcher, and Horsford.

Potatoes.—Potatoes were planted April 28, May 6, 16, 22, and 26, using old land in all cases. One patch planted May 22 has failed entirely, but the others have done fairly well. In each of the best two fields I dug 1 rod September 9, and the yield was 18 pounds. This, at 800 rods of potato rows to the acre, gives a yield of 240 bushels. The tubers should grow considerably still this fall, as the vines at this time are still in bloom and vigorous. Potatoes on sandy land will yield a little more than half as well as those above noted.

Radishes.—Radishes were planted in large quantities and at various times with good results. Early Scarlet, Long Scarlet, Early Bird, French Forcing, all did as well as could be expected at every planting, but the radishes soon became hollow. Black Spanish germinated well, but ran to seed before making roots of desirable size. Scarlet China Winter radishes were sown in August and are looking well now, but will need several weeks of growing weather to make satisfactory roots.

Ruta-bagas.—Ruta-bagas of two varieties were planted, one plat of each April 28 on sandy land, similar to that on which they made a good yield last year. The roots are small at this writing and the yield will be light, although the seed germinated well. May 26 another plat of each was sown. The land is better, and the roots will be larger, but not so large as last year on the same ground. The kinds planted were Yellow Swede and Sweet Russian.

Salsify.—Long White has succeeded for the first time in our experience. The tops have grown to 18 inches high, but the roots are small, about three-fourths of an inch in diameter.

Turnips.—Amber Globe, White Milan, and Yellow Aberdeen were sown May 25 and 26. The roots will be small and the yield very light on the ground that gave such excellent results last year. In an old garden which is very rich we had a few turnips which measured 8 inches in diameter. The crop is practically a failure.

FLOWERS AND TREES.

With flowers, such as poppies, nasturtiums, corn flower, sweet peas, and pansies we have had success, as usual. Several hardy bulbs secured a year ago last spring failed to survive the winter. Shrubs have failed to do any good, but I still believe both bulbs and shrubs could be grown. Small fruits have been given little attention, but hardy varieties should do well. One crab-apple tree has survived and has made a little growth in three summers. Some black locust seed was sown in the spring and a few seed germinated and have produced plants 2 inches high.

LIVE STOCK.

The winter was severe on stock that was not fed and, as few people were prepared to feed throughout the winter, many cattle died and many calves could not be raised.

At the orphanage, counting our own and orphanage cattle, the loss of cows and calves was 10 head altogether. Some of these losses might be attributed to the severe winter, others were occasioned by falling from cliffs, 1 by drowning, 1 from injury, and for 1 the cause is unknown.

However, the cattle have done well this summer, and from a herd of 5 milch cows, 3 of which are giving milk for the first time, the following record was made, in August, which is about the same as the other months since the first of June:

Milk record of 5 cows for month of August, 1903.

	Pounds.		Pounds.		Pounds.
August 1	85.5	August 12	93	August 23	87.5
August 2	85.5	August 13	71.5	August 24	83.5
August 3	87	August 14	76	August 25	85
August 4	91	August 15	87	August 26	86
August 5	85.5	August 16	88.5	August 27	90
August 6	83	August 17	83	August 28	85.5
August 7	86	August 18	82	August 29	83.5
August 8	79.5	August 19	84.5	August 30	83.5
August 9	95.5	August 20	83	August 31	85
August 10	97.5	August 21	85		
August 11	85	August 22	85.5	Total	2,649.5

This record was made with no feed except pasturage in woods. The calves were not allowed to suck the cows, but were fed on fresh milk for several weeks, then on skimmed milk until they ate grass freely, since which time they have had nothing but grass, and they are vigorous and doing well. From the milk we have had all we wanted for our large family and have made an average of 12 pounds of butter a week since the middle of June.

Since the spring work was completed the horses have been allowed to run loose. They have become very fat with no feed except grass.

The Angora goats wintered with but little feed and attention. They ate the silage readily and browsed from the spruce trees. They were sheared April 21 and yielded 22 pounds of good quality of mohair—4 pounds for each doe and 6 pounds for the buck. Samples were sent to a dealer in mohair, and 30 cents per pound was offered for the same. This spring the buck died, owing to his eating a large quantity of ground feed. There has been no increase in the flock.

Poultry has ever been one of the most profitable departments of our work. The past year has been no exception, although we have met with some serious reverses.

An incubator was added last spring and was run successfully in hatching both chickens and ducks which were intrusted to homemade brooders, patterned after plans given in what was supposed to be a reliable authority. At the age of about a week the chicks began to die, and but few were saved from the first hatch. Afterwards the chicks were given to hens and they thrived better. We have at this time about 70 young chickens and 40 young ducks. The yield of eggs may be interesting, and is given by months for each variety.

Egg-laying record of hens and ducks.

	March.	April.	May.	June.	July.	August.	Total.
B. Langshans, 24 hens	240	339	438	285	250	420	1,972
W. Wyandotte, 2 hens	12	33	25	14	14	20	98
Pekin ducks, 3 hens	12	87	77	50	.....	.....	226
Common ducks, 6 hens	.....	103	121	90	.....	.....	314
Total	.....	.....	.....	.....	.....	.....	2,610

The Pekin ducks mature much more quickly than the common kind, do not sit, are not rangers, and need water only for drinking.

The Wyandotte chicks seem less hardy than the Langshan, and we have succeeded in raising few of them. A small flock of geese has been added to the list of poultry. Others have succeeded very well with them here and at Kadiak.

CURTIS P. COE,
Superintendent Kadiak Baptist Orphanage.

I beg leave to call special attention to the following letter from Mr. W. H. Swinehart, at Fort Selkirk, Yukon Territory:

DEAR SIR: Yours dated May 14, 1903, just at hand, and in reply will make an effort to describe in a meager way the methods we pursue after five years' experience at agricultural work on the Yukon.

To begin with, we are the pioneer farmers of this country beyond a doubt, as we were plowing on June 21, 1898, at this place, our present field of operations. Further, we do not wish to be classed with the truck gardener of this section, as we adhere strictly to field farming without irrigation, nor do we use hothouses or hotbeds of any description—just straight farming, pure and simple. In the East many believe that we must use canvas or other means to start plants, and then transplant to the field or garden. This is erroneous. We sow seeds in drills after the soil becomes fit to receive them. First our home garden, usually from May 1 to May 10 (as early as possible of course); after that we drill according to the vegetables and the time it takes to mature them.

We grow winter-keeping goods altogether, as we have no truck market at this point. Last season we seeded for winter goods the following dates: Carrots and beets, May 10; potatoes, May 14; ruta-bagas, June 3; parsnips, June 4; cabbages, May 7. We considered it too early for the ruta-bagas, as they grew too large for nice marketable goods, and this year we will not seed for ruta-bagas before June 20.

Oats we sow in the usual way about May 1 and harvest rather green for hay. Oats fully mature here—at least they have the past four seasons.

What experiments we have made with grasses have been with timothy and *Bromus inermis*. The latter does best on dry lands. We have sown timothy seed with oats, on May 1, and harvested August 5 as good a crop as can be raised in almost any country, the timothy standing from 24 to 39 inches in height, with longer and heavier heads than the average crop growth in the States. We have never seen such a growth from timothy seed in any other place, and we know that it will sound like a fairy tale to many, if not all, eastern farmers. But when one takes into consideration the twenty-hour sunlight in every twenty-four hours of the day—June has twenty-one hours' sun every day from the 15th to the 25th—and compares the sunlight the farmers in the East get, one can readily see almost a double growth in the same growing months. We have grown 10 tons of oat hay from 3 acres of land. We have only 18 acres under plow, and about half of this we seed to oats for hay, the balance to winter-keeping vegetables. We have also large native hay marshes, but the demand for native hay is almost a thing of the past. The growth of native grasses is something marvelous, and we use it on the ranch extensively.

Last year we harvested 11 tons of fine Early Rose potatoes from 2 acres of land, digging them September 10 to 15.

Our most troublesome plant has been the cabbage. We found that early planting gave the poorest results, and from experiments along the line deduce the following: The cabbage plant grows so fast during May and June that the leaves become so large and heavy that when the folding season begins they are too overgrown to lift and fold without assistance, consequently can not make solid heads. As a result from experimenting with this plant, we drill the seed like other vegetables in the field—this year May 16. Last season we had all our box cabbage plants that had been transplanted to the field killed by a frost on June 9. They were of a good size, about 3 inches high, and were frozen into the ground. Alongside was cabbage from seed sown a month later, in the field, none of which were touched by the frost. Acclimated during growth, they made fine heads, some of them bursting they were so solid. The house-raised plants were a failure. From this experience we have abandoned all transplanting, confining our efforts to the method outlined.

Small garden truck, such as lettuce, radishes, peas, and onions from seeds grow readily with little care and attain a larger size in the same growing time than we have ever seen elsewhere. We have grown ruta-bagas that weighed 20 pounds, turnips 15 pounds, winter radishes 6 pounds, and potatoes 1½ pounds each, all within 90 days of drilling the seed. Beets and carrots do the very best with us, and are among the best sellers on the market. We attribute this wonderful growth to the extra sunlight. We do not claim that all the valleys in the Yukon Territory will give the results we have mentioned above, for our observations in moving about the Territory have been that three-fourths of the soil in the Yukon Valley carries too much gravel to grow anything in the form of roots, as there is no subsoil to retain moisture. Then, again, much of the soil in this section of the Territory is too wet and cold. Further, the late July and August frosts along the Yukon River and its tributaries are much heavier and much earlier than at some distance back. For example, at Fort Selkirk, only 2 miles distant from our ranch, they had heavy frosts two weeks earlier than we had in August, 1902. Our first frost came August 21.

We are clearing hay lands this season and seeding to timothy, which seems to be the best grass for bottom lands which are not too wet. To be inside the limit, we will say that oat hay yields 2½ tons per acre, and nets us from 5 to 6 cents per pound; ruta-bagas, 6 tons per acre, and about 6 cents per pound or more; potatoes, 5 tons per acre, and nets 10 to 15 cents a pound, if held over for spring market. Carrots and beets, at least 3 tons per acre, and we get from 15 to 18 cents a pound for them. Cabbage varies in yield and nets 15 to 20 cents per pound, and the demand is usually

more than the supply. Having just started on timothy meadows, we are not in a position to make any positive statement as to the yield, but we think it safe to say we will get $100 per ton for good timothy hay for some time to come.

We have a variety of wild berries near us, including the gooseberry, currant, raspberry, cranberry (both high and low bush), blueberry, and strawberry, but we have not yet given these any attention in the way of cultivation. We are trying the tame strawberry, but as we got our first plants last season can not say what can be done successfully, or otherwise, until the end of the present season.

Rhubarb is a success with us, also parsnips. Both keep through the winter months in the field same as in the East.

We are, respectfully, etc.,

W. H. Swinehart,
Selkirk Ranch, Yukon Territory.

REPORTS FROM SEED DISTRIBUTION.

Following summaries are from a few of the reports which have been received from the seed distributed to settlers. They contain much valuable information, and intending settlers and others who desire to post themselves on Alaska can not do better than to read these letters, as they will give them an insight into the conditions in all parts of the Territory:

Rev. W. Duncan, Metlakahtla.—I am sorry to have to report unfavorably of our garden work this year. Whether our nonsuccess was due to the seeds, the excessive wet weather, or to our bad management I can not say, but we never have, that I can remember, had such poor returns for our labor at gardening.

Joseph Howard, a native of Metlakahtla.—Cabbage, spinach, turnips, carrots, radishes, peas, and lettuce were planted, seaweed and fish being used as a fertilizer with excellent results. The rhubarb has also made a good growth. We planted it in soil mixed with sand. All of the flower seeds grew nicely. We have only a little garden, but hope next year to have more room to plant all the seeds you send us.

Mr. Fred Patching, superintendent of the Naha salmon hatchery, Loring.—A start was made at this place last spring. During the month of May a few square feet of ground were cleared and planted to vegetables. Cauliflower seeds were planted in the new soil without any fertilizer whatever and did very well, some of the heads weighing as much as 4 or 5 pounds, and very sweet and tender. Cabbage planted at the same time in boxes and afterwards set out did not amount to auything without fertilizer, but when I buried some fish under the plants they did very well. Radishes did fine without fertilizer, and I raised the second crop on the same ground. Lettuce was planted (the seed) without fertilizer and came up very slowly, and did not grow over one-half an inch, and died out before the end of the season. Rutabagas did fairly well without fertilizer where sown, and better where transplanted. Turnips did very well without fertilizer, and some were about 8 inches in diameter and very solid and nice. Carrots did very well without fertilizer. Onion seed was planted and used for green onions, also without fertilizer. I planted about 18 or 20 potatoes, also without fertilizer, and dug about 70 or 80 pounds. A bed about 4 feet square was made, in which some fish were buried, and planted a package of rhubarb seed and got about 35 nice healthy plants.

I have read your suggestions to pioneer farmers, and will say that this place being 8 miles from salt water seaweed is out of the question, but have lots of fish (salmon during the shipping season in the fall), and if it can be used as a fertilizer it is the easiest way of getting rid of it. This fall I spaded up the ground and buried all the fish the ground would cover, also built cribs and filled them in with layers of dirt and fish for use on new ground in the spring. In applying it last fall I had a trench

spaded out and then filled with salmon and the dirt dug from next trench, covered them, and the operation was repeated until the ground was all dressed.

R. L. Petty, Howkan.—Vegetables were raised from seeds distributed last year. The gardens were planted on Dall Island, about 3½ miles from Howkan, in what is known as Saw Mill Cove, on the east side of the island. All ground was new, having been cleared of brush, etc., about six weeks before planting. I used seaweed, as recommended by the Department, at about 30 tons to an acre, and for new ground I consider the showing as splendid.

Garden No. 1, planted on April 25, containing 600 square feet. Lettuce was tender, extra fine quality, and lasted until October 20; Flat Dutch turnips, splendid, lasted until November 1; radishes were crisp and fine, on table twenty-four days after planting, and had them fresh and crisp until November 10; the kale this year was of the best, enjoyed by all, is still growing finely (January 3) without cover, expect plenty of early greens; Windsor beans, only fair, planted too late; parsnips and peas were in abundance and of the finest quality.

Owing to press of work in mill I did not get garden No. 2, containing 600 square feet, planted until May 5. Carrots, beets, and onions were produced; turnips were splendid and in abundance; celery, very fine, but not large—of this we had a great deal; cauliflower was set out too late, as heads did not grow large, very few being more than 4 inches in diameter, but as we had a large number of plants, size of heads did not matter. We all agree that it was as good as we ever tasted anywhere. Cabbage was put out rather too late; heads were small, but most excellent. I think cabbage needs other food in connection with seaweed. Spinach very fine and in large supply. The rhubarb sown was very fine. It was planted April 15 in large deep box, fertilized with manure from chicken house, and it grew very large and tender. We used it quite a number of times—something rather out of the common for the first year. Balance of the ground was planted to potatoes, which gave a fine crop.

John K. Smith, Howkan.—I am sorry that I am not able to make a more favorable report on the seeds sent me by the Department of Agriculture. This year I have, as most people living around here had, to be away during the fishing season, and my garden was of course neglected, but for the last eight years I have had a good garden.

I find that potatoes, cauliflower, cabbage, turnips, and celery do very well here; carrots, beets, and parsnips not so good; lettuce, radishes, and peas, excellently; black and red currants, medium crop; raspberries, medium; gooseberries, not so good, and apples so far have been a failure. I am trying to get a Russian crab apple. I have some apples grafted on to the native crab apple, and will report whether successful or not in a year or two. I find that the best fertilizers for raising crops on new soil are seaweed and slaked lime and decayed clam shells. I spread plenty of seaweed every fall on my ground and dig it under in the spring, and when planting my potatoes use it in the hills. I distributed the seed I did not use to the natives. It is hard to get them to plant except in the way they are accustomed to, but some of them I have gotten to try cabbage, kale, lettuce, and radishes, and a good many of them are growing different kinds of berries.

Mrs. Annie Blaylock, Juneau.—Your kindness in forwarding me seeds bore fruit by supplying us with vegetables all summer and considerable left for fall use. It is wonderful how they grow here, and the size is all that is desired. I find that some varieties are better than others; notably the round radishes and curly lettuce do much better than the others. Our cauliflower, cabbage, and beets have been a failure owing to a large green worm that is called here, rightly or wrongly, "army worm." During the last two seasons my rhubarb, spinach, and cress salad went to seed very early from some cause, but all grew well. Kale and turnips came up well, but the worms soon finished them, also the ruta-bagas, and toward the last they tried a let-

tuce diet. My flowers did very well, and I have enjoyed an abundance of them. Of course, you will understand that my flower and vegetable garden is on a comparatively small scale; nevertheless the vegetable garden was quite a help in household affairs, and, being always fresh, the vegetables were relished.

W. H. Marrett, Haines.—In the spring of 1902 I sowed several acres of grain, chiefly oats, but owing to the almost constant rain after the 1st of July they amounted to nothing, and I saved no hay worth mentioning. My potatoes were good, though not at all remarkable. Last spring I had too little confidence to sow much grain again, but a small amount of wheat, barley, and oats near the stable did mature all right. Such garden seed as I could get grew quite well. The radishes, I think, were fully as good as any I have ever seen. My potatoes were excellent and yielded well. I used a 2-horse mowing machine and harvested a good crop of hay, but not nearly so much as I should have done had I anticipated such a fine season as it proved to be.

I did, however, make one crop so superior that I will give quite full particulars. From a small patch of ground near my building I mowed off the grass and fed it out to my horses during the month of June. The last day of the month I plowed and harrowed about half an acre and, without fertilizing at all, sowed turnip seed broadcast July 1. I was away then for a few weeks, and on my return found they were quite large, and so thick that it was difficult to step on any part of the ground without treading on turnips. August 30 I took off 25 sacks, what I could conveniently handle at once. Some of them weighed from 3 to 3½ pounds each, and all who tried them pronounced them the finest and best flavored they had ever seen. On September 10 I marketed as many more and the same amount on September 21. During the next few days I harvested enough to bring the total up to 110 sacks, and still it looked like a good crop. During the first days of October I harvested the balance and to my surprise found that the total was 180 sacks, averaging about 75 pounds. There was not a hollow or woody one in the whole lot. I never ate such delicious turnips before, and though I have traveled extensively in nearly every State and Territory, and considerably in Canada, Mexico, and Europe, I have never before seen any such quantity produced with so little labor or on so little ground. They were chiefly the Early Purple Top. One small package of the seeds was the Golden Ball, and there was about the same amount of the Pomeranian White Globe. These three varieties did about equally well.

H. F. Emmons, Porcupine.—Most of the seeds received were successfully grown. The sample of large beans only blossomed, though I planted them in a warm place. The vines grew 4 feet high and blossomed profusely, but did not produce edible pods. Lettuce, radishes, carrots, and onions grew well. The early cabbage went to seed. The asparagus came up all right. The turnips were very good. The white ruta-bagas ran to small roots. I sent to Bowen's seed house and obtained some yellow ruta-bagas, and they do better here.

I am more and more impressed with the superiority of hill soil for potatoes. My neighbor, Mr. Clark, had a good yield of potatoes, but they are nearly worthless, being full of water and tasteless. I planted the same kind of seed, as we both obtained 200 pounds each of Early Rose from Bowen's seed house, in Seattle, and in the spring my crop raised on Sicle Hill, slate loam, are mealy, crack open when cooked, and are pronounced the best, while Mr. Clark's go begging, and are perfectly worthless. I owned a good farm in Berkshire County, Mass., but never raised finer potatoes, turnips, cabbage, and, in fact, all kinds of vegetables, than right here in Alaska. The soil is rich everywhere. An old, gravelly side hill that one would think would not grow anything is the place potatoes grow and thrive.

W. P. Benn, Skagway.—As to my success in agriculture, my soil is a very sandy loam, composed of decomposed granite and river silt and fertilized with stable manure in moderate proportions, and this is my second year's cultivation. Time of

planting, May 15 to 25. Windsor beans, blood beets, and carrots, excellent growth and good crop; cabbage, three varieties, never saw finer or better quality, many heads weighing 10 pounds each; cauliflower, two varieties, largest and best I ever saw anywhere; celery and lettuce, four varieties, unsurpassed; onions, three varieties, excellent crop, medium size and well matured; parsnips, enormous yield of large roots, high flavor; parsley and spinach, excellent; turnips, ruta-bagas, and radishes, many varieties, finest quality and great yield; tomatoes, strong, vigorous growth, plenty of fruit, but did not mature; cucumbers, strong, vigorous growth, plenty blossoms, but no fruit; summer squash, strong, vigorous growth, small fruit; German wax beans, strong, vigorous growth, small fruit; rhubarb, strawberries, raspberries, gooseberries, and currants, the second season and great success; potatoes, Early Ohio, immense yield, good, dry, and well matured, ripe September 1; Early Rose, immense yield, but poor quality, sweet and watery; Burbank, immense yield, quality medium; Snowflake, large yield, medium size, excellent quality, ripe September. Romanow wheat, Manshury barley, and Burt Early oats, sowed May 20, same soil, fully matured August 20; good average height and yield. Common oats and barley seed from Seattle, sown at the same time and on similar ground, were much better in size of grain, straw, etc., and matured quite as early on a 4-acre tract. The present season was very unfavorable, owing to the unusual rainfall in July and August.

Charles M. Brown, Skagway.—The seeds you sent were a perfect success. I planted what I could of them and gave the rest to my neighbors, who were pleased with them and what they produced. The rhubarb was of the finest quality, and fit to pull long before the season was up; the cabbage was large and good; the carrots and parsnips were excellent in yield and quality; some of them went to the Minneapolis fair. From three short rows of ruta-bagas, about 25 feet long, there were over 400 pounds, all sound and solid; one weighed 16½ pounds after it was trimmed of top and roots; six of them weighed 72 pounds, and all were large. I think we have the happy medium of climatic conditions for gardening in Alaska here in Skagway. Flowers do well here.

L. A. Burke, Skagway.—The seed you sent last year did finely, particularly the cauliflower and cabbage. Of the former I had one which measured 3 feet in circumference and weighed 7 pounds. The carrots, turnips, and ruta-bagas also did well; in fact, everything I planted turned out very successfully.

A. J. Aehison, Skagway.—The seeds sent me for experiment have been thoroughly tested and I am much pleased with the results. I have raised over 1,000 pounds of vegetables on a lot 50 by 100 feet, the ground having been cleared last year and stable manure used for fertilizer. The first seeding out of doors was March 31. Lettuce, radishes, and turnips were sown June 3; also some August 10. Peas were sown June 3; also beets, cauliflower, carrots, cabbage, parsnips, Brussels sprouts, cress, potatoes, and mustard. Cabbage, ruta-bagas, turnips, carrots, and potatoes were cultivated but very little, although they matured perfectly. I found lime an excellent fertilizer for beets, but a detriment to peas. The rhubarb grew to a height of 18 inches, and celery matured with scarcely any attention.

John Nyland, Valdez.—I have been advised to write and request that you would kindly furnish me with several varieties of seed both for garden and field culture suitable to this climate. I have taken up a 40-acre tract on the west side of Valdez Bay, about 1 mile southeast of Fort Liscum, on which I have built a house for myself and family, whom I expect to join me in the spring. I have also done considerable work on the tract in the way of clearing and getting it in order for cultivation as early in the spring as the weather will permit of farm work, as it is my intention to begin farming in dead earnest, and being a Finn and raised on a farm near the border of Sweden up to 1883 until I came to this country, I should and do know something about farming. In a cold climate like this it means hard work and patience, and I

feel and think I will make a success of it in Alaska equal to if not better than in my native land. Since coming to America I have lived twelve years in the Northwest Lake country and six years in this part of Alaska. I am a strong, healthy man of 53 years, and am good for twenty years more of active life if no accident befalls me, and by that time I hope to be the owner of both a model Alaska farm and home that will be a credit to both your Department and myself.

Fred Lilyegrem, Little Naked Island, Prince William Sound.—By request I send you report of what success I had with the seeds you so kindly sent me last spring. My partial failure was no doubt due to the newness of the ground, and as I have only a small spot cleared, about 15 by 30 feet, I did not have a chance to try all of the seeds. Of lettuce and radishes planted May 19 I had two crops in the same benches. Peas, turnips, and ruta-bagas planted the same date did very well. Beets were small and dwarfish. Cabbage only a few headed up. Some potatoes (my own seed) that I planted did very well. The only fertilizer I have used so far is seaweed. Next year my own ground will be in a better condition and I can reasonably expect a bountiful supply of garden truck for family use.

Ed. Edelman, Kenai.—In regard to my garden this summer I am glad to inform you that my potatoes did better than usual. Last spring I got 60 pounds of Early Rose from Mr. H. P. Nielsen, and in addition I had 15 pounds of Burbank. I planted them May 18. The result was 14 sacks. One potato weighed 2½ pounds and many weighed 1½ pounds. Peas and carrots did very well, but ruta-bagas and cabbage not as well as in former years.

A. Lawson, Sunrise, Cook Inlet.—I have the pleasure to report that the seed package sent last year gave good results where the conditions and the soil have been favorable. My principal garden crop has been potatoes, about 2 tons being dug from 175 pounds of seed. When the land was too heavily manured with horse dung the tubers grew rather large and some of them were hollow, but for the main part the crop was all that I could desire. Have sold over 1,000 pounds at 4 cents per pound, and expect to have ready sale for all I can spare. Cabbage and cauliflower did very well. Some heads of cauliflower weighed 7 pounds. Celery did not grow very well, owing perhaps to the soil being new and too sour. Lettuce did the best of all my vegetables. All who saw and used this vegetable pronounced it the finest they ever saw or ate. Some heads weighed about 5 pounds, and from a small piece of ground got enough to supply the whole community. Peas did very well, but could spare for them only a small piece of ground. Radishes were grown in abundance and of the very best kind. Rhubarb made a very good start, and I expect good results next year. Turnips and ruta-bagas did very well; several of the latter weighed 10 pounds apiece. Beets grew large and tender. Tomatoes grew nicely and had an abundance of flowers, but stopped growth when the rains commenced. Will endeavor to have them out earlier and in better soil next year.

The clover and grass seed came up all right, and I hope they will grow. Timothy has grown around my cabin since 1898, and produces seed every year. Clover is springing up wherever I applied manure, so I have no doubt but that it will thrive here. This season I have planted a patch of rye, which now (October) is about 8 inches high, looks fine, and has stooled out nicely.

My land in cultivation this year is little more than an acre, but during the dry part of each year I manage to burn off stumps, roots, and moss from adjoining ground, so increasing the area each season. The soil is rather thin and rocky, except where it has been swampy. The location is about three-fourths of a mile from Sunrise City, where I manage to procure manure from a few pack horses that are kept there in the winter time. So far I am the only one that has tried to raise truck near Sunrise, and in spite of many disadvantages I find it easier and more profitable each year. I am a native of Sweden and know whereof I speak when I assert that this section of Alaska is in many ways superior for general farming to the province where

I was raised and where the population would think themselves very fortunate if they could produce such crops as will grow here. The rich native grasses growing spontaneously wherever the sun gets to the soil, and the abundance of wild fruits to be had here would of itself be inducement enough to entice immigration to this country. This fall I have picked 15 gallons of the little berry known here as the low-bush cranberry, but which I think is called whortleberry in English ("Lingon" in Swedish), and the preserves of which are infinitely superior to any dried or canned fruit in the market. My potatoes grew up to September 24, when the vines were cut down by the frost. Part of my cabbage is out in the garden yet, October 22, 1902, and I believe this season is about the same as the previous years, at least since 1897, when I came here.

A. Lawson, Sunrise, Cook Inlet.—I am sending you samples of the grain raised this season (1903). The barley was harvested in the latter part of August and the other kinds a month later. The rye and wheat you sent me were planted August 29. It is up and looks fine. My vegetables have grown better this year than ever before. (Pl. XIII, fig. 1.) I have as fine a lot of potatoes, turnips, beets, ruta-bagas, parsnips, and carrots as you will see anywhere. My crop of early cabbages and cauliflowers is sold off. Some of my cabbages weighed up to 12 pounds. I am reasonably certain that rye, wheat, barley, and oats, also the various grasses, can be grown to perfection as soon as the seeds shall have become sufficiently acclimated. The first frost occurred here September 23, and potato vines were killed September 27.

G. M. Palmer, Knik, Cook Inlet.—The seeds I did not use myself were distributed among the natives, and some of them raised quite a number of potatoes, turnips, and beets. Of course the ground is new yet and there is no fertilizer here, so the yield is small, but it is a help to them.

My own garden was not as good as last year, as I was away during June and most of July. Of the seeds I planted, cabbage, kale, cress, lettuce, and cauliflower did well. Turnips and ruta-bagas were a partial success, due only to lack of attention. Beets came up and all went to seed. Parsnips and carrots did not come up. Radishes grew finely, but there is a white worm here that eats into the roots and stops the growth. The top appears to grow all right, but the root will be only about as large as a large bean, and the worm will be inside.

G. Roll, Hope City, Cook Inlet.—I am sending you samples by this mail of Burt Extra Early oats, Manshury barley, Romanow Spring wheat, Silver Hull buckwheat, and Broad Windsor beans. The above-named cereals were planted May 17 in new soil. It was rather dry at the time they were planted, therefore they made a very poor start, and it continued so until July 3, and we have had very little rain from then up to the present time. Last year the grain we had was much better; more matured than the samples we send you by this mail.

The Windsor beans planted May 31 were in blossom by July 10. We also planted Improved Golden Wax beans on May 31. They were in bloom by July 10, and were eatable by August 13. This is the first year we have had good marketable string beans, and potatoes are larger and better than any year heretofore. Onions have never been a success. All other vegetables, such as cabbage, cauliflower, turnips, ruta-bagas, beets, carrots, parsnips, radishes, lettuce, and peas do well, just as well as in any part of the United States. (Pl. XIII, fig. 2.)

D. W. Harvey, Tyonek.—This is my third season at Tyonek. Last year I was successful with all kinds of garden vegetables. This season was late, frost remaining in the ground until May 20. On May 20 I planted lettuce, radishes, onions, parsnips, beets, carrots, ruta-bagas, and peas, and on May 28 potatoes. White Dutch turnips, sown May 28, were ready for the table July 20. I had peas ready for the table this year August 25. Cabbage is also ready for the table at this date, September 6; beets also. Early peas do the best. Of the turnips tried White Dutch is the best. Purple Top lettuce has the largest heads. Rhubarb does well, the largest I ever saw was raised

from the seed you sent me two years ago. Potatoes do splendidly, especially Early Rose and Burbank, and of cabbage Early York and Jersey Wakefield. The last named has the largest heads. I had one for dinner that weighed 10 pounds, and have 50 more the same size.

J. C. Smith, Simeonoffsky.—I have planted in my garden this year potatoes, cauliflower, cabbage, beans, peas, Brussels sprouts, and turnips. Everything is doing well. My cabbage, cauliflower, potatoes, and turnips can not be beat in the country. The oats and barley have matured all right, but the weather will not allow them to dry. This is the worst summer for wind and rain that has been seen here for the last ten years. The grasses you sent me have done well, especially the rye grass and clover. I have quite a cattle ranch here of 25 head of first-class cattle.

Henry S. Tibbey, Coal Harbor.—I prepared a small clearing in an old grove that had been the year previous planted in turnips, and after fertilizing it well with seaweed, on May 11, planted in subdivisions Romanow wheat, Ladoga Spring wheat, Manshury barley, and Finnish barley, being the seed that you sent me. In one month from the date of planting the Romanow wheat and Manshury barley were 18 inches above the ground. By last mail I sent you a sample of the barley, and by this steamer mail you a sample of the wheat as pulled from the ground on September 11 and 20, respectively. The Ladoga wheat and Finnish barley did not succeed quite as well as the other two. Next year I should like to plant at least an acre each of Romanow wheat and Manshury barley, if you will advise me where the seed can be purchased.

Mrs. Emma H. Rock, Carmel, Nushagak post-office.—There are four or five native gardens in this village, planted mostly in turnips; some carrots, ruta-bagas, and peas; also potatoes. All natives are very fond of turnips, but it is considered almost too much trouble to raise them. Everything must be carefully fenced, for there are many dogs. The mission has a large and very fine garden. All the white settlers at this village—seven in number—have cultivated a patch, planted mainly in potatoes. They also raise some of the smaller vegetables, as turnips, ruta-bagas, cabbage, and a few onions. Potatoes, ruta-bagas, peas, radishes, lettuce, carrots, kohl rabi, and kale succeed very well in this climate; others, such as onions, beets, rhubarb, and all cereals (not including corn, for that is a failure), would like a little warmer and a longer season.

Taking in all there has been a very marked improvement in agriculture in this district during the past five years, for which the mission can honestly take much credit. First we went ahead and made a success of gardening ourselves, then we gave out seeds of all kinds and showed and encouraged our neighbors, as well as the natives, how to use them.

J. H. Romig, Ougavig, Kuskokwim River.—The soil at the station of Ougavig is a deep loam, and very productive of red top and other wild grasses. The soil is warm and ready for the planting of seeds, and the transplanting of hotbed plants by the 1st of June. In former years the latter part of May.

Early Jersey Wakefield cabbage has given the best satisfaction, and has matured in large, very crisp and delicious heads. The seed was planted in the hotbed early in April and transplanted the 1st of June. Early Egyptian and Early Blood Turnip beets were planted in the hotbed April 11, and transplanted early in June. By the end of August the beets had matured and could have been used before that date. They were from 2 to 3 inches in diameter and of most excellent quality. The French Breakfast and Early Scarlet radishes were the varieties planted. They rapidly matured and were of most excellent quality. Planted in open ground late in May, and at intervals of a few weeks until August. Purple Top and Early White Milan turnips, and a yellow variety, name not known, did very well, were large, and of a most delicious quality. This is the land of turnips. They were planted in May in the open ground. Yellow and white ruta-bagas planted in the hotbed in April and

FIG. 1.—ALASKA STATIONS—MR. A. LAWSON'S GARDEN, SUNRISE, COOK INLET, AUGUST 15.

FIG. 2.—ALASKA STATIONS—CABBAGE AND POTATOES AT HOPE, COOK INLET, AUGUST 16.

transplanted to open ground the first part of June, grew large and were of excellent quality. Early Half Long carrots planted in the hotbed the first part of April and transplanted in the early part of June, matured well, and by the latter part of August the bulbs were from 1 to 1½ inches in diameter. Hollow Crown parsnips was the only variety planted. Planted in hotbed the first part of April, and transplanted 1st of June. The largest roots reached the size of 1½ inches in diameter. Large Hanson, Early Prize Head lettuce, and many other varieties did very well. Were planted in hotbed and in open ground from early spring to the middle of June. All did well and can be scarcely surpassed for quality and size. An early variety of peas planted in open ground about the 1st of June, did well, and peas were of good quality for table use. Black wax beans, planted in hotbed the middle of April and transplanted to open ground the middle of June, though not a success as in warmer climates; green beans of excellent quality were raised for table use by August 20. Extra Early Erfurt cauliflower, planted in hotbed early in April and transplanted early in June, gave a few good heads.

Among field crops, two varieties of oats were sown, just to have something that looks like the States growing in the garden besides the vegetables. The seed was planted late in May in the open ground. The growth of the straw was equal to any in the States, and some of the seed matured, but the plant was green when the frost killed it early in September. A year or so since a small plat of buckwheat was planted as described for the oats above. The yield was very good, but many of the grains were caught by the frost while only partially filled out.

A. C. Karleson, Unalakleet.—The garden work has been very successful this year owing to the early spring and warm summer. The varieties raised were potatoes, ruta-bagas, turnips, parsnips, carrots, radishes, cabbage, lettuce, rhubarb, spinach, peas, and beans. Some of the turnips were quite large, weighing up to 11 pounds. The peas did nicely, but the beans failed. I seeded some turnips and carrots, but the latter did not ripen before the frost came. I experimented with some oats, and it did grow to maturity. I also tried other seed besides the above mentioned, but it never came up—probably too old.

I beg leave to call special attention to the following report from Mr. John A. Dexter, of Golovin. This little settlement is located on Golovin Bay, north of latitude 64° and not very far from Nome, in a treeless, wind-swept region, and surrounded by the icy waters of Bering Sea. In the light of these facts, the results reported by Mr. Dexter seem little short of miraculous.

John A. Dexter, Golovin Bay.—I began gardening June 6, 1901, at Chinik or Golovin, not far from Nome, and have continued every year, and have been successful with the following: Lettuce, radishes, carrots, peas, parsnips, turnips (small white), ruta-bagas, sage, thyme, marjoram, potatoes, onions, leek, beets, spinach, kale, chicory, water cress, pepper grass, chives, cauliflower, cabbage, oats, and barley.

The last three summers my gardens have exceeded my expectations. Last summer some of my ruta-bagas weighed 8½ pounds, and six varieties of turnips were all of a fine size and excellent flavor. Lettuce raised in this section excels any I have ever eaten. I have also raised as high as five crops of radishes in a season. The lettuce we cut instead of pulling it by the roots, and in less than a week it is large enough to cut again; some heads measuring 26 inches around, and weighing 2¼ pounds. Carrots grow splendidly. I find that the Short Horn, and several other hardy varieties, grow to be quite large, and for table use are far superior to the carrots raised on the coast. The average size is about 2½ inches around and 6 inches long.

Oats also grow fine and ripen. I planted a piece of ground 20 by 16, and it was the prettiest piece of oats ever seen. It grew 4 feet tall, and the oats were heavy and in

every way developed. I sincerely believe that Alaska could produce enough oat hay to feed a very large amount of stock. There is one drawback for raising it for grain; some seasons are very rainy, but to cut during the month of July, there is nothing better for hay. Potatoes grew very well last season. The frost destroyed the tips on the 2d of September, retarding the growth; still some of my crop weighed 1 pound and averaged about 3 to the pound.

My garden is the only one in this section, but at Nome there are quite a number who raised radishes and lettuce and did a fine business supplying restaurants and hotels at 50 cents per head of a few leaves. My garden of 2½ acres is situated on a point on the north shore of Golovin Bay and is exposed to all of the strong gales, being only 60 yards from the beach, and has Golovin Bay on the south and Golovin Sound on the north. The soil is a sandy loam and is rarely fit for planting before the 1st of June. I have not tried hotbeds or hothouses, raising everything from seed planted in the open air and using very little fertilizer. I consider this section much better adapted to agricultural pursuits than parts of Norway and Sweden, and I can see no reason why Alaska can not produce nearly all her vegetables needed. The Yukon Valley is as good a farming country as the northern part of Minnesota, in fact taking the long summer day with 20 hours of sunshine, it makes a pretty fair growing season.

During the past season I raised 500 pounds of carrots, 2,500 pounds of turnips, 2,000 pounds of potatoes, 300 pounds of parsnips, 150 pounds of onions, and other vegetables in abundance, also sweet peas for flowers. I also keep 2 horses, 2 cows, 1 bull, cutting all the feed here, except oats for the horses; 5 pigs, raised from April to October, averaged 150 pounds and were only fed one month before killing time, and 2 goats, which were killed by the dogs.

Mrs. Charles P. Phillips, Council City.—The seed you sent last year I used this spring. I could not begin to use all of the lettuce. I have given it away to all friends, also radishes. I planted carrots, parsnips, turnips, radishes, mustard, beets, onions, three kinds of lettuce, sweet peas and nasturtiums, all in three beds, inclosed with a fence about 18 feet square. It is a small place to call a garden, but I get lots of green food from it. Now, as to the way we grow the plants. We put down large logs and fill them level with stable manure, then 6 inches with black soil, about 4 inches of sand or wash from the river. I have had this garden three summers. Last year we filled it level with manure and put the old soil on top with the dirt. The manure is in the bottom and keeps it warm and, as none of the things I desire have long roots, it does not burn them. The ground is so cold and it is the only way I can see to form a heat under plants.

I am the only one in this part of the country that tries to have a garden, and I could not get along without it. The first lettuce I planted was on May 1 and on July 4 had nice lettuce for dinner. Last fall I took in the house six heads half grown and kept in the window until Thanksgiving day and had it for dinner, and it was a treat. I had some nice large turnips and beets last season.

J. A. Morgan, Dawson, Y. T.—You will find with this letter some samples of oats, wheat, and barley that were grown here from the seed you sent us. We planted it on May 22, and by July 20 the barley was 47 inches high, the wheat 45 inches, and the oats 42 inches. It was ripe September 1, and at that time the wheat was 47 inches high, barley 45 inches, oats 42 inches. From the way it did I should think it would go about 60 bushels to the acre. The vegetables did finely. From the Jersey Wakefield cabbage you sent us we got heads that weighed 12 pounds, and none less than 6 pounds. We started those and cauliflower in the house the 1st of April, and set them outdoors the 1st of June. We had Early Snowball cauliflower that weighed 3 pounds, and none less than 1 pound. The Purple-Top Strap-Leaf turnips did not get very large, but were nice and tender. They were planted the 1st of

June and we had some the last of July. Laing Improved ruta-bagas were quite large, the largest weighing 2½ pounds. They were nice and tender. They were planted at the same time, but we did not have any until September 1. Early Scarlet Horn carrots did nicely. They were about 8 inches long and about 3 inches in diameter. Ready for the table about August 20. Onions were only good for young onions. Egyptian beets got quite large, some being 3 inches in diameter. Early Market and Alaska peas yielded finely. They grew about 14 inches high. We also planted some Atlantic Prize tomatoes outdoors. The plants grew about 20 inches high, and bore so many tomatoes they had to be propped up with sticks. They were all ripe by the 1st of September. From 15 sacks Early Rose potatoes we got 250 sacks, and they were as nice as could be grown anywhere; some weighed 2 pounds.

Peter Lundine, Eagle.—The three kinds of wheat, barley, and oats matured perfectly. The wheat reached a height of 5 feet; the oats, some as high as 5⅔ feet; and barley, 5 feet. The turnips and cabbage also did well, but prefer the Yellow Globe turnip for this climate. I raised 100 sacks of potatoes on three-fourths of an acre of ground. This year I planted 4 acres of Early Rose potatoes. I now have 5 acres in cultivation. Have a house, 3 cows, 2 calves, and several pigs. This year I built a double log barn, and, if expectations don't fail, by this coming fall I shall have a large silo.

John H. Robinson, Circle.—Mr. E. E. Reynoldson, chief office deputy marshal, and myself cultivated a garden this year, using Department seeds, and will give you a report as to growth, etc.

Early Jersey Wakefield cabbage does not prove to be the most suitable for the Yukon; they mature too early and burst open, and so will not keep during the summer. The Flat Dutch and Drumhead varieties seem better adapted to our conditions. Turnips grew well and large; we had some 8 or 9 pounds in weight and 27½ inches in circumference. Our beets were the best in Eagle, three of them averaging 4 pounds in weight, and were as fine as could be seen anywhere in the world. Parsnips grew more tops than roots, but attained 4 or 5 inches in length and 2 inches largest circumference. Carrots were excellent, large, firm, and well matured. Cauliflower matured too early, but were large. Peas were excellent, bearing large and continuously. Garden beans, large flat, we tried, and they can be grown well, pods averaging 4 to 5 inches and well filled. Celery not grown. Radishes fair. Lettuce good. We grew enough vegetables for two families in lot 50 by 100 feet this summer; also about 5 bushels of potatoes.

By the way, the people in Dawson gave an exhibition of vegetables on the Yukon this month and, for outside of Dawson districts, Father Monroe, of the Jesuit Mission, received first prize for assortment of vegetables, and Reynoldson and Robinson, of Eagle, second prize.

George F. Bemis, Circle.—I enclose you samples of peas and barley which I raised from the above seeds furnished by you. I experimented also with cabbage; the Early York was very hard and of fine quality, weighing from 4 to 6 pounds. I raised from 8 pounds of potatoes which were planted this year 126 pounds. My rhubarb stood the winter and came up this spring, and the leaves are fine. Carrots, parsnips, turnips, ruta-bagas, cress, Brussels sprouts, beets, string beans, and all such truck I have raised with good results, as have also others to whom I have distributed the seed. Red and alsike clover lived through the winter and came up in good shape. The latter kind I think did the best. I feel satisfied that millet and timothy would do well if you would send some; also several kinds of small fruit—strawberry, raspberry, etc.

Last year I did not water any of my truck, but resorted to a more extensive use of the hoe, and found it all right, and am following the same plan this year. Since

planting my first little garden in 1898, at Circle, I have shown to the people that very many things can be raised here that was at that time thought impossible, and, as a result, at least 15 or 20 acres are in grain and vegetables about town this year.

Edward J. Knapp, St. Andrew's Mission, Rampart.—Mr. B. A. Knott, an old German miner who has been here for several years and has taken considerable interest in gardening, planted a garden this year in which he grew a variety of vegetables—peas, bush beans, and garden beans, white and purple top turnips, beets, ruta-bagas, cabbage, kale, lettuce, radishes, celery, carrots, parsnips, potatoes, and parsley, a great variety, some of which did very well indeed. On a piece of ground 25 by 40 feet he gathered a crop of turnips that weighed nearly if not quite a ton. Some of the roots weighed over 6 pounds. Some of his potatoes reached a fair size, though many were very small. The cabbage headed well, but did not grow large. The kale developed quite well, growing plants that spread to a diameter of 30 inches. The cabbage and some of the kale were started in the late spring indoors, but kale planted later out of doors did better than that the growth of which was forced. Some of the turnips, too, that were planted late grew quickly and developed better than those transplanted earlier. The ruta-bagas did not do very well, nor did the beets, parsnips, or carrots. The celery grew only about 8 inches tall. The peas did very well; so did the bush beans. The garden beans did poorly, though they bore. The lettuce, especially the red variety, did well.

Mr. Knott took much interest in his garden and worked at it hard. The early part of the season was very dry, and this set back the growth of the plants. The water had to be carried daily from the creek to the top of the bench until the plants got well rooted. Some of the soil cultivated by Mr. Knott was new. A part of it he treated with ashes and got good results wherever the ashes were used. There was no severe frost here until the latter part of August.

A. H. Monroe, Rampart.—American Wonder peas planted in the latter part of June in very good soil on a bench or bar about 20 miles from the mouth of Baker Creek and 80 miles up the Tanana from Fort Gibbon grew fine and were full of blossoms, and a few pods beginning to fill by the last of August. Silver Hull buckwheat was doing excellent, about 3 to 3½ feet high, and seed forming, doing well, some in the dough. Mustard, some as high as 3 feet and seed pods well filled. Some of the lettuce was very large and tender. The onions came up but only a few lived, and they got about one-fourth of an inch in diameter. The carrots and parsnips did not come up. The cabbage got about 3 inches high. The kale got about 10 inches high and had some very nice leaves. The Purple-Top Strap-Leaved turnip did well. The white turnips went more to leaves. The ruta-baga is most too slow a grower for this country, I think, although some got as large as 2 inches in diameter.

The experiment station at Rampart did very well in raising grain. I visited the station with Mr. J. W. Duncan, and the wheat was well headed and well filled with large plump grain. The black oats, some of which was 6 feet high, had long heads well filled. The rye was sown too thick, but the grains are as nice as I ever saw. I saw both beets and parsnips that lived in the ground over winter where they grew and had gone to seed, and the seed seemed to mature all right.

E. T. Townsend, Rampart.—There have been several very successful gardens here this summer, and I have heard several speak of planting extensively next summer. One thing is sure, that any garden planted early and but slightly tended will yield large returns, if planted on reasonably good soil.

Mr. Knott and Mr. E. J. Knapp planted quite a large garden at Rampart, and had remarkable success with all of the ordinary vegetables, harvesting more than a ton of turnips. I saw some of the grain, barley, wheat, oats, buckwheat, etc., which grew on the Government farm (so called) this summer, and it was remarkably fine, with large plump heads and very rank.

J. F. Karshner, Baker Creek Station.—I have a fine locality as to soil and lay of land, facing the south on a large flat. It is about 6 miles from the Tanana River and about the same distance from Baker Creek Station. It is tempered by hot springs, which is no small affair, for they spread along the stream for a mile, hot and warm water oozing out and forming three small streams which empty into a creek into the Tanana.

The seeds you sent me were in fine condition and fresh, as all came up. I received a fresh package from the States in time to get in early. I had lettuce, radishes, peas, beets, carrots, and turnips, all large enough to eat by July 4. In fact the lettuce and radishes were large enough to eat by the last of June.

I wish you could see my garden as it looks now (August 22). Cabbage heading beautifully; potatoes in full bloom, and a late kind at that. If I had had Early Rose I think I would have had potatoes large enough to eat by this time. Cucumbers and tomatoes are doing finely. The California squash is looking remarkably well. The squashes are as large as my head. Turnips that a few weeks ago weighed 4 pounds are now as large as a man's head. The ruta-bagas are simply enormous, and potatoes are filling out as well as I ever saw them. I have never seen vegetables grow as they do around the springs. I had no frost here when it was freezing at Baker Creek Station. I planted peas, beets, radishes, turnips, and lettuce April 20, and they were up May 1, and no frost to hurt them, though there was 3 feet of snow on the benches only a short distance away. I appreciate the difference in the climate, and the heat on the ground one had to see to believe.

J. L. Lucchesi, S. J., Holy Cross Mission, Koserefsky.—In general, results were encouraging. The potatoes, Early Rose, are larger and better than ever. Soggy potatoes are getting rare. We have such an abundance that, besides supplying this large institution and outlaying missions, we have enough to feed the cows. All the other vegetables that are usually grown here have given their wonted satisfaction. Even tomatoes, though tried for the first time, were fit for table use. They were pulled green, however, as they had not time or heat enough to ripen.

We are still trying the grains, and by the samples sent you you will see that oats and buckwheat are not far from success. As yet but few matured seeds on the ears, but we hope by planting these seeds, grown in the country, that the ears will mature more and more each succeeding season as the seed becomes acclimated. Corn failed, owing to having the wrong brand of seed, I think. As for the hay crop, we have more than enough, and our herd, more than doubled since you were here, need have no fears of going hungry the coming winter. Clover blossoms for the first time adorned our fields this summer. In fact it is hard to realize that this spot, once covered with trees, brush, and moss, could in so short a time be brought to its present fruitful and beautiful state.

One of the sisters at Holy Cross Mission.—In the spring of 1902 we planted some Broad Windsor and Lima beans and both did well. We distributed much seed among the Indians of this village and in Piment, and they seemed quite in earnest to start little gardens, but the great drawback is the scarcity of tools. We are lending ours to the Indians around this village whenever we can, and it is a great encouragement.

SOIL TEMPERATURES.

Readings, taken at 7 a. m., in degrees Fahrenheit. Thermometers planted 6 and 24 inches deep, respectively. Radiation thermometer shows the daily minimum temperature 6 inches above surface of ground.

Soil temperatures.

SITKA EXPERIMENT STATION.

Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.
1903.	°F.	°F.	°F.	1903.	°F.	°F.	°F.	1903.	°F.	°F.	F.
May 8 ..	45.0	40.5	35.0	July 1...	54.0	50.0	45.0	Aug. 24.	58.0	54.0	39.0
May 9 ..	44.0	40.5	32.0	July 2...	54.0	50.0	44.0	Aug. 25.	58.0	53.5	38.0
May 10.	43.5	41.0	32.0	July 3...	54.0	50.0	44.0	Aug. 26.	57.0	54.0	44.0
May 11.	43.5	41.5	32.0	July 4...	54.0	50.0	39.0	Aug. 27.	57.0	54.5	37.0
May 12.	44.0	41.5	34.0	July 5...	54.0	50.0	38.0	Aug. 28.	56.0	54.0	34.0
May 13.	45.0	42.0	33.0	July 6...	55.0	50.0	39.0	Aug. 29.	56.0	53.5	31.0
May 14.	45.0	42.0	32.0	July 7...	56.0	50.5	40.0	Aug. 30.	56.0	54.0	34.0
May 15.	44.0	42.0	31.0	July 8...	56.0	50.5	40.0	Aug. 31.	57.5	54.0	31.0
May 16.	45.5	42.0	30.0	July 9...	55.0	50.5	45.0	Sept. 1..	56.0	53.0	34.0
May 17.	46.0	42.5	29.0	July 10..	55.0	50.5	40.0	Sept. 2..	56.5	54.0	32.0
May 18.	47.0	42.5	36.0	July 11..	57.0	51.0	40.0	Sept. 3..	55.5	54.0	30.0
May 19.	46.0	42.5	34.0	July 12..	55.0	51.0	40.0	Sept. 4..	55.0	53.5	31.0
May 20.	46.0	42.5	30.0	July 13..	56.0	51.0	38.0	Sept. 5..	56.0	53.5	32.0
May 21.	46.0	43.0	28.0	July 14..	56.0	51.0	33.0	Sept. 6..	56.0	53.5	31.0
May 22.	46.5	43.5	29.0	July 15..	55.5	51.5	45.0	Sept. 7..	55.0	53.0	37.0
May 23.	46.5	43.5	32.0	July 16..	56.0	51.5	56.0	Sept. 8..	55.0	53.0	32.0
May 24.	46.5	43.5	39.0	July 17..	56.0	51.5	56.0	Sept. 9..	56.0	53.5	34.0
May 25.	46.5	43.5	32.0	July 18..	56.0	51.5	56.0	Sept. 10.	55.0	53.5	34.0
May 26.	46.5	43.5	36.0	July 19..	55.0	51.5	44.0	Sept. 11.	54.0	53.5	33.0
May 27.	47.0	44.0	37.0	July 20..	54.0	52.0	48.0	Sept. 12.	56.5	53.5	34.0
May 28.	47.0	44.0	32.0	July 21..	53.0	52.0	45.0	Sept. 13.	56.0	53.0	34.0
May 29.	48.0	44.5	38.0	July 22..	55.0	52.0	34.0	Sept. 14.	53.0	52.5	38.0
May 30.	48.0	44.5	40.0	July 23..	56.0	52.0	34.0	Sept. 15.	53.0	52.0	38.5
May 31.	48.0	44.5	39.0	July 24..	56.0	52.0	33.0	Sept. 16.	53.0	52.5	44.0
June 1..	48.0	44.5	35.0	July 25..	57.0	52.0	36.0	Sept. 17.	53.0	52.0	40.0
June 2..	48.0	44.5	37.0	July 26..	55.0	52.0	34.0	Sept. 18.	52.5	52.0	36.0
June 3..	48.0	44.5	38.0	July 27..	56.0	52.0	36.0	Sept. 19.	54.0	52.0	34.0
June 4..	48.5	44.5	32.0	July 28..	57.0	53.0	45.0	Sept. 20.	50.0	52.0	30.0
June 5..	49.0	45.0	32.5	July 29..	56.0	52.0	40.0	Sept. 21.	50.5	51.5	29.0
June 6..	49.5	45.0	38.0	July 30..	56.0	53.0	42.0	Sept. 22.	51.5	51.0	26.0
June 7..	50.0	45.5	40.0	July 31..	57.0	52.5	41.0	Sept. 23.	49.0	51.0	36.0
June 8..	52.5	46.0	46.0	Aug. 1..	56.0	52.5	40.0	Sept. 24.	49.0	51.0	29.0
June 9..	52.5	46.0	46.0	Aug. 2..	56.0	53.0	36.0	Sept. 25.	49.0	51.0	34.0
June 10.	52.5	46.0	41.0	Aug. 3..	56.0	53.0	37.0	Sept. 26.	49.0	50.5	33.0
June 11.	52.5	46.0	42.0	Aug. 4..	58.0	53.0	35.0	Sept. 27.	48.5	50.5	30.0
June 12.	52.0	46.0	30.0	Aug. 5..	59.0	53.0	39.0	Sept. 28.	50.0	51.5	31.5
June 13.	52.0	46.0	32.0	Aug. 6..	60.0	53.0	39.0	Sept. 29.	49.5	51.0	33.0
June 14.	52.0	47.0	44.0	Aug. 7..	59.0	53.5	39.0	Sept. 30.	50.0	50.5	31.0
June 15.	52.5	47.0	42.0	Aug. 8..	59.0	53.0	45.0	Oct. 1...	48.0	50.5	20.0
June 16.	52.5	47.5	40.0	Aug. 9..	56.0	52.5	44.0	Oct. 2...	46.5	50.0	19.0
June 17.	53.5	47.5	35.0	Aug. 10.	58.0	54.0	46.0	Oct. 3...	45.5	49.5	19.0
June 18.	53.5	47.5	40.0	Aug. 11.	58.0	54.0	47.0	Oct. 4...	48.0	50.0	23.0
June 19.	55.0	47.5	45.0	Aug. 12.	57.0	54.0	45.0	Oct. 5...	46.5	49.0	26.0
June 20.	55.5	48.0	40.0	Aug. 13.	58.0	53.5	39.0	Oct. 6...	45.5	49.0	31.0
June 21.	55.5	48.5	40.0	Aug. 14.	57.5	54.0	35.0	Oct. 7...	46.0	49.5	32.0
June 22.	55.5	48.5	43.0	Aug. 15.	57.0	54.0	34.0	Oct. 8...	46.5	49.0	26.0
June 23.	55.5	49.0	43.0	Aug. 16.	58.0	54.0	34.0	Oct. 9...	45.0	49.0	23.0
June 24.	55.5	49.5	45.0	Aug. 17.	58.0	53.5	34.0	Oct. 10..	45.5	49.0	25.0
June 25.	55.0	49.5	44.0	Aug. 18.	58.0	53.5	38.0	Oct. 11..	45.0	49.0	26.0
June 26.	55.0	49.5	42.0	Aug. 19.	59.0	54.0	40.0	Oct. 12..	45.5	49.0	30.0
June 27.	54.0	49.5	40.0	Aug. 20.	57.0	54.0	45.0	Oct. 13..	46.0	49.0	30.5
June 28.	54.0	49.5	42.0	Aug. 21.	57.0	52.0	44.0	Oct. 14..	45.0	49.0	30.0
June 29.	54.0	49.5	42.0	Aug. 22.	58.0	54.0	44.0	Oct. 15..	44.0	47.0	31.0
June 30.	54.0	50.0	45.0	Aug. 23.	58.0	54.0	41.0				

COPPER CENTER EXPERIMENT STATION.

1903.	°F.	°F.	°F.	1903.	°F.	°F.	°F.	1903.	°F.	°F.	°°F.
May 1 ..	33.0	31.0	31.0	May 17 .	38.0	32.0	23.0	June 2..	44.0	38.0	28.0
May 2 ..	34.0	31.0	29.0	May 18 .	40.0	32.5	30.0	June 3..	44.0	38.0	26.0
May 3 ..	34.0	31.0	22.0	May 19 .	42.0	32.5	32.0	June 4..	42.0	38.5	35.0
May 4 ..	35.0	31.0	29.0	May 20 .	41.0	33.0	26.0	June 5..	42.5	38.0	29.0
May 5 ..	35.0	31.5	27.0	May 21 .	41.0	34.0	32.0	June 6..	43.0	38.5	37.0
May 6 ..	36.0	31.5	26.0	May 22 .	40.0	34.0	33.0	June 7..	45.0	39.0	29.0
May 7 ..	36.0	31.5	22.0	May 23 .	39.5	34.5	18.0	June 8..	50.0	40.0	38.0
May 8 ..	36.0	31.5	27.0	May 24 .	40.0	34.5	36.0	June 9..	50.0	40.0	28.0
May 9 ..	36.0	31.5	24.0	May 25 .	40.0	35.0	33.0	June 10.	50.0	41.0	27.0
May 10 .	35.5	31.5	21.0	May 26 .	41.0	35.0	27.0	June 11.	49.0	41.0	31.0
May 11 .	35.0	31.5	25.0	May 27 .	42.0	35.5	24.0	June 12.	49.0	41.5	31.0
May 12 .	37.0	31.5	31.0	May 28 .	41.0	36.0	21.0	June 13.	52.0	42.0	42.0
May 13 .	39.0	32.0	27.0	May 29 .	41.5	36.5	22.0	June 14.	51.5	42.5	42.0
May 14 .	40.0	32.0	46.0	May 30 .	42.0	37.0	28.0	June 15.	48.5	42.5	32.0
May 15 .	41.0	32.0	38.0	May 31 .	46.0	37.5	39.0	June 16.	50.0	42.5	39.0
May 16 .	38.0	32.0	25.0	June 1..	44.0	38.0	36.0	June 17.	50.0	43.0	29.0

Soil temperatures—Continued.

COPPER CENTER EXPERIMENT STATION—Continued.

Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Radiation thermometer.
1903.	°F.	°F.	°F.	1903.	°F.	°F.	°F.	1903.	°F.	°F.	°F.
June 18.	50.0	43.0	38.0	July 22.	53.0	48.5	36.0	Aug. 25.	52.5	50.5	44.0
June 19.	50.0	45.0	40.0	July 23.	52.5	48.5	30.0	Aug. 26.	47.5	50.0	24.0
June 20.	53.0	45.0	44.0	July 24.	54.0	48.5	30.0	Aug. 27.	47.5	49.5	20.0
June 21.	57.0	46.0	36.0	July 25.	55.0	49.0	29.0	Aug. 28.	45.0	49.0	16.0
June 22.	59.0	47.5	42.0	July 26.	57.0	49.5	40.0	Aug. 29.	46.0	48.5	33.0
June 23.	57.5	47.5	44.0	July 27.	56.0	49.5	46.0	Aug. 30.	43.0	48.5	19.0
June 24.	55.0	48.0	34.0	July 28.	57.0	50.0	47.0	Aug. 31.	44.0	48.5	20.0
June 25.	55.0	47.0	42.0	July 29.	56.0	50.0	47.0	Sept. 1..	42.5	48.0	16.0
June 26.	50.0	47.0	40.0	July 30.	55.0	50.0	30.0	Sept. 2..	43.0	47.5	18.0
June 27.	50.0	46.5	39.0	July 31.	55.0	50.0	33.0	Sept. 3..	44.0	46.5	11.0
June 28.	52.5	46.5	38.0	Aug. 1..	55.5	50.5	28.0	Sept. 4..	42.5	46.0	11.0
June 29.	52.0	46.5	37.0	Aug. 2..	57.5	50.5	46.0	Sept. 5..	42.0	46.0	17.0
June 30.	53.0	46.5	36.0	Aug. 3..	57.0	50.5	47.0	Sept. 6..	44.5	46.0	22.0
July 1..	55.0	47.0	31.0	Aug. 4..	56.0	50.5	48.0	Sept. 7..	45.0	46.0	35.0
July 2..	55.0	47.0	47.0	Aug. 5..	56.0	50.5	42.0	Sept. 8..	44.0	46.0	31.0
July 3..	50.5	47.5	30.0	Aug. 6..	52.5	50.5	27.0	Sept. 9..	41.0	46.0	10.0
July 4..	57.0	47.0	41.0	Aug. 7..	53.0	50.0	31.0	Sept. 10.	41.5	46.0	11.0
July 5..	55.0	47.0	35.0	Aug. 8..	57.5	50.0	47.0	Sept. 11.	40.5	45.5	13.0
July 6..	57.0	48.0	45.0	Aug. 9..	57.5	50.5	48.0	Sept. 12.	41.0	45.0	18.0
July 7..	59.0	48.5	53.0	Aug. 10.	57.0	50.5	45.0	Sept. 13.	43.0	45.0	36.0
July 8..	58.0	49.0	46.0	Aug. 11.	55.0	50.5	40.0	Sept. 14.	44.0	45.0	46.0
July 9..	58.0	49.0	45.0	Aug. 12.	55.0	50.5	33.0	Sept. 15.	42.0	45.0	41.0
July 10.	56.0	49.0	30.0	Aug. 13.	56.0	50.5	28.0	Sept. 16.	45.0	45.0	33.0
July 11.	57.5	49.0	40.0	Aug. 14.	55.0	50.5	29.0	Sept. 17.	42.5	45.0	26.0
July 12.	55.0	49.0	24.0	Aug. 15.	53.0	50.5	28.0	Sept. 18.	42.5	44.5	23.0
July 13.	55.0	49.0	45.0	Aug. 16.	56.0	50.5	44.0	Sept. 19.	39.0	44.5	20.0
July 14.	54.0	49.0	42.0	Aug. 17.	58.0	50.5	45.0	Sept. 20.	39.0	44.0	20.0
July 15.	53.0	49.0	39.0	Aug. 18.	57.0	50.5	47.0	Sept. 21.	38.5	43.5	15.0
July 16.	54.0	49.0	42.0	Aug. 19.	56.0	50.5	44.0	Sept. 22.	38.0	43.0	17.0
July 17.	54.0	48.5	29.0	Aug. 20.	53.0	50.5	45.0	Sept. 23.	38.0	42.5	12.0
July 18.	52.0	48.5	40.0	Aug. 21.	53.5	50.5	36.0	Sept. 24.	37.0	42.5	15.0
July 19.	55.0	48.5	42.0	Aug. 22.	53.0	50.5	38.0	Sept. 25.	37.0	42.5	14.0
July 20.	53.0	48.5	42.0	Aug. 23.	51.0	51.0	26.0	Sept. 26.	35.5	41.5	11.0
July 21.	52.0	48.5	32.0	Aug. 24.	51.0	51.0	32.0	Sept. 27.	32.0	41.0	4.0

KENAI EXPERIMENT STATION.

Day.	6-inch thermometer.	24-inch thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Day.	6-inch thermometer.	24-inch thermometer.
1902.	°F.	°F.	1903.	°F.	°F.	1903.	°F.	°F.
Sept. 1.....	52.5	49.5	May 19.....	37.0	.....	June 18....	55.0	38.5
Sept. 2.....	51.0	49.5	May 20.....	37.0	.....	June 19....	51.0	40.0
Sept. 3.....	52.0	49.5	May 21.....	36.0	.....	June 20....	50.0	40.5
Sept. 4.....	53.0	49.0	May 22.....	37.0	.....	June 21....	50.0	41.0
Sept. 5.....	53.0	49.0	May 33.....	35.0	.....	June 22....	49.5	41.0
Sept. 6.....	52.0	49.0	May 24.....	37.5	.....	June 23....	52.0	41.5
Sept. 7.....	50.5	49.0	May 25.....	39.0	.....	June 24....	55.0	42.0
Sept. 8.....	50.5	49.0	May 26.....	41.0	.....	June 25....	53.5	42.5
Sept. 9.....	51.0	48.5	May 27.....	39.0	.....	June 26....	52.5	43.0
Sept. 10....	48.5	48.5	May 28.....	41.0	.....	June 27....	53.0	43.5
Sept. 11....	49.0	48.0	May 29.....	40.0	.....	June 28....	55.0	43.5
Sept. 12....	47.5	48.0	May 30.....	42.0	.....	June 29....	53.5	44.0
Sept. 13....	48.0	47.5	May 31.....	41.5	.....	June 30....	53.5	44.5
Sept. 14....	48.0	47.5	June 1.....	41.0	32.0	July 1.....	55.0	44.5
Sept. 15....	46.0	47.0	June 2.....	42.5	32.0	July 2.....	51.5	45.0
Sept. 16....	47.5	47.0	June 3.....	42.5	32.0	July 3.....	54.0	45.0
Sept. 17....	49.0	47.0	June 4.....	41.0	32.0	July 4.....	56.0	45.0
Sept. 18....	47.0	46.5	June 5.....	44.0	32.5	July 5.....	53.0	45.0
Sept. 19....	46.5	46.5	June 6.....	45.0	32.5	July 6.....	54.0	45.5
Sept. 20....	47.0	46.5	June 7.....	44.0	33.0	July 7.....	53.0	46.0
Sept. 21....	47.5	46.5	June 8.....	45.0	33.5	July 8.....	53.0	46.0
Sept. 22....	48.0	46.5	June 9.....	44.5	34.0	July 9.....	54.5	46.0
Sept. 23....	46.5	46.5	June 10....	44.0	34.5	July 10....	55.0	46.0
Sept. 24....	44.5	46.0	June 11....	43.0	35.0	July 11....	55.5	46.5
Sept. 25....	42.5	45.5	June 12....	44.0	35.0	July 12....	54.5	46.5
Sept. 26....	40.5	45.0	June 13....	43.5	35.5	July 13....	54.0	46.5
Sept. 27....	42.0	44.5	June 14....	44.5	36.0	July 14....	54.0	47.0
Sept. 28....	43.0	44.0	June 15....	46.0	36.5	July 15....	54.5	47.0
Sept. 29....	44.5	44.0	June 16....	48.0	37.0	July 16....	55.0	47.5
Sept. 30....	45.0	44.0	June 17....	53.5	37.5	July 17....	54.0	47.5

Soil temperatures—Continued.

KENAI EXPERIMENT STATION—Continued.

Day.	6-inch thermometer.	24-inch thermometer.	Day.	6-inch thermometer.	24-inch thermometer.	Day.	6-inch thermometer.	24-inch thermometer.
1903.	°F.	°F.	1903.	°F.	°F.	1903.	°F.	°F.
July 18	53.0	47.5	Aug. 12	56.5	50.5	Sept. 6	52.0	49.5
July 19	55.0	47.5	Aug. 13	58.0	50.5	Sept. 7	52.0	49.5
July 20	55.0	47.5	Aug. 14	58.5	50.5	Sept. 8	52.5	49.0
July 21	55.5	47.5	Aug. 15	59.0	51.0	Sept. 9	52.0	49.0
July 22	55.5	48.0	Aug. 16	61.0	50.0	Sept. 10	52.0	49.0
July 23	55.5	48.0	Aug. 17	58.0	51.5	Sept. 11	50.5	49.0
July 24	59.0	48.0	Aug. 18	57.5	51.5	Sept. 12	50.0	48.5
July 25	58.0	48.5	Aug. 19	57.5	51.5	Sept. 13	50.5	48.5
July 26	55.5	49.0	Aug. 20	57.0	51.5	Sept. 14	52.5	48.5
July 27	52.5	48.5	Aug. 21	57.5	51.5	Sept. 15	53.0	48.5
July 28	56.0	49.0	Aug. 22	57.0	51.5	Sept. 16	51.0	48.5
July 29	56.0	49.5	Aug. 23	58.0	51.5	Sept. 17	50.5	48.5
July 30	57.0	49.5	Aug. 24	56.0	51.5	Sept. 18	50.0	48.5
July 31	56.0	49.5	Aug. 25	56.0	51.5	Sept. 19	49.5	48.5
Aug. 1	54.0	49.5	Aug. 26	55.0	51.5	Sept. 20	48.5	48.5
Aug. 2	54.0	49.5	Aug. 27	55.0	51.5	Sept. 21	49.0	48.0
Aug. 3	57.0	49.5	Aug. 28	55.5	51.0	Sept. 22	48.0	48.0
Aug. 4	55.0	49.5	Aug. 29	55.0	51.0	Sept. 23	46.0	47.5
Aug. 5	56.0	49.5	Aug. 30	53.5	50.5	Sept. 24	45.5	47.0
Aug. 6	56.0	49.5	Aug. 31	54.0	50.5	Sept. 25	46.5	47.0
Aug. 7	58.5	50.0	Sept. 1	54.0	50.0	Sept. 26	45.0	46.5
Aug. 8	56.5	50.0	Sept. 2	52.5	50.0	Sept. 27	43.0	46.0
Aug. 9	57.0	50.0	Sept. 3	53.5	50.0	Sept. 28	41.5	45.5
Aug. 10	57.5	50.0	Sept. 4	52.0	50.0	Sept. 29	42.0	45.0
Aug. 11	57.0	50.5	Sept. 5	51.0	49.5	Sept. 30	40.0	44.5

METEOROLOGICAL REPORTS.

Heretofore we have published the accumulated weather reports each year, but as they are now becoming too voluminous, only the last year's records are submitted herewith. They speak for themselves.

Meteorological observations.

KETCHIKAN. D. S. Whitfield, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1902.	°F.	°F.	°F.	*Inches.*				
May[a]	57	44	48.9	2.79	5	2	2	6
June	78	46	57.5	3.31	28	1	1	14
July	69	62	58.6	5.62	25	3	3	9
August	73	64	55.9	22.39	4	15	12	25

KILLISNOO. Joseph Zuboff, Observer.

1902.								
October	57	32	43.5	4.60	.....	5	26	13
November	47	19	32.7	2.75	9	5	16	13
December	41	10	23.7	2.90	10	4	19	13
1903.								
January	41	4	29.5	4.05	3	6	22	20
February	40	8	30.7	2.40	1	9	13	13
March	46	10	29.4	.20	15	7	9	3
April	59	21	38.6	6.15	16	.....	14	4
May	61	31	45.3	2.55	5	2	24	9
June	72	38	53.5	.75	5	16	9	7
July	70	42	55.1	1.15	6	13	12	5
August	72	41	55.8	2.30	9	10	12	9
September	63	35	49.4	3.10	3	9	8	16

[a] 9 days.

Meteorological observations—Continued.

SITKA. F. E. Rader, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1902.	°F.	°F.	°F.	*Inches.*				
October	59	32	47.2	8.25	2	11	18	19
November	50	23	37.3	6.19	13	2	15	14
December	46	8	27.4	5.93	6	3	22	14
1903.								
January	54	10	33.7	6.61	3	3	25	18
February	44	10	33.9	8.68	2	2	24	19
March	50	11	34.0	2.57	15	3	13	10
April	63	21	39.5	4.25	5	13	12	15
May	56	32	43.6	3.65	3	6	22	14
June	77	36	52.35	.87	8	8	14	4
July	77	42	55.1	2.85	5	8	18	10
August	79	42	57.6	3.9	12	6	13	13
September	67	30	51.2	5.80	6	13	11	19

JUNEAU. John McLaughlin, Observer.

1902.								
October	65	31	45.5	6.57	3	11	17	15
November	46	20	32.4	7.38	10	1	19	12
December	40	8	23.5	4.26	9	10	12	9
1903.								
January[a]	.....	5	.....	11.31	5	7	19	.....
February	42	7	31	7.29	10	2	16	13
March	47	12	30.8	3.04	13	7	11	8
April	58	16	39.6	3.74	8	5	17	11
May	60	36	46.77	6.74	11	6	14	19
June[b]	79	39	55.3	1.44	15	5	6	7
July[a]	77	46	56.8	2.36	7	3	9	8

SKAGWAY. H. D. Clark, Observer.

1902.								
October	58	25	42.96	1.75	4	15	12	9
November	48	4	27.21	1.24	15	7	8	4
December	45	− 2	16.36	1.44	12	4	15	5
1903.								
January	47	−17	19.29	2.08	7	17	7	5
February	44	− 1	27.1	1.44	5	16	7	8
March	48	5	29.0	.43	15	8	8	1
April	60	9	39.41	.48	8	14	8	3
May	61	31	48.45	1.10	6	12	13	4
June	82	33	57.5	.56	17	7	.....	4
July	79	41	58.5	.02	14	2	15	1
August	78	39	55.32	2.08	19	2	10	8
September	65	32	49.96	1.41	7	14	9	11

ORCA. W. J. Shephard, Observer.

1902.								
September[c]	68	34	47.9	12.71	4	8	2	9
October	57	30	41.0	35.56	5	7	19	25
November	42	11	30.9	11.10	10	9	11	12
December	39	7	23.9	11.42	14	5	12	12
1903.								
January	45	11	25.2	16.74	6	9	15	16
February	44	20	30.5	16.60	2	8	18	20
March[d]	.....	.....	.....	.....	.....	.....	.....	.....
April[d]	.....	.....	.....	.....	.....	.....	.....	.....
May[d]	.....	.....	.....	.....	.....	.....	.....	.....
June[d]	.....	.....	.....	.....	.....	.....	.....	.....
July[e]	90	45	58.7	5.81	10	10	1	10
August	76	44	57.2	10.75	13	7	11	13
September	67	38	52.3	16.67	13	9	8	9

[a] 27 days.
[b] 26 days.
[c] Report for 14 days.
[d] Not reported.
[e] Report for 23 days.

Meteorological observations—Continued.

WOOD ISLAND. Rev. Curtis P. Coe, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1902.	°F.	°F.	°F.	*Inches.*				
January	49	5	30.60	3.89	8	2	23	19
February	49	27	36.89	6.29	2	1	25	22
March[a]	55	14	34.39	4.33	9	6	16	8
April	59	9	37.31	2.66	5	8	17	8
May	71	34	47.16	5.55	11	4	15	13
June	82	38	59.11	1.55	15	1	14	6
July[b]	82	40	58.89	1.87	9	.....	22	14
August[a]	77	41	56.05	6.15	5	2	24	16
September[c]	72	38	53.28	5.23	6	3	21	16
October[d]	67	27	44.83	3.75	8	3	20	11
November[e]	53	11	34.52	5.00	14	7	9	8
December[a]	43	−12	22.21	4.95	7	3	26	13
1903.								
January	42	4	25.27	4.74	13	.....	18	10
February	54	.....	29.30	8.10	3	3	22	16
March	60	19	37.63	.39	19	1	11	2
April	51	13	37.37	4.61	11	.....	19	14
May	61	33	44.06	4.92	2	.....	29	18
June	70	36	51.68	7.80	9	2	19	16
July[e]	76	43	55.86	4.38	10	3	18	10
August	85	55	58.51	4.79	5	3	23	14

FORT LISCUM. C. J. Bartlett, Observer.

1902.								
October	50	18	34.9	18.20	4	5	22	23
November	37	0	21.13	6.98	15	5	10	11
December	41	−12	14.64	12.74	22	3	6	9
1903.								
January	36	−10	14.78	10.62	14	.....	17	16
February	39	−10	17.64	13.60	8	.....	20	16
March	38	22	17.67	4.72	20	.....	11	9
April	46	6	16.60	3.87	19	.....	11	8
May	68	30	46.25	2.23	20	.....	11	9
June	72	32	48.84	3.24	15	.....	15	11
July	70	37	51.15	4.29	11	.....	20	17
August	68	34	50.38	6.44	15	.....	16	16
September	66	24	44.18	8.62	18	.....	12	11

KENAI. H. P. Nielsen, Observer.

1902.								
September	62	16	46.23	4.69	5	7	18	21
October	54	8	37.5	3.28	6	10	15	12
November	42	−26	19.98	2.58	7	9	14	8
December	35	−43	.18	3.90	18	1	11	6
1903.								
January	49	−36	6.4	1.78	9	8	14	8
February	42	−46	18.27	5.70	4	3	21	15
March	44	−13	18.95	1.27	19	5	6	4
April	59	−17	28.21	1.32	17	6	7	5
May	64	23	42.55	.54	9	9	13	5
June	87	29	49.95	1.16	6	9	13	8
July	74	31	51.9	2.48	12	7	12	11
August	75	29	53.8	3.75	10	9	12	15

[a] 29 days only.
[b] 28 days only.
[c] 25 days only.
[d] 23 days only.
[e] 27 days only.

Meteorological observations—Continued.

TYOONOK. Thomas W. Hanmore, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1902.	°F.	°F.	°F.	*Inches.*				
September	66	25	48.25	6.46	4	11	15	16
October	58	20	40.45	4.93	6	11	14	15
November	39	−13	22.20	.94	12	5	13	5
December	34	−21	9.48	1.72	18	3	10	5
1903.								
January	38	−12	10.9	1.95	14	12	5	8
February	39	−21	19.45	3.91	5	4	19	15
March	49	0	24.27	.45	22	3	6	2
April	56	− 1	32.1	1.01	15	4	11	4
May	68	30	44.86	.65	15	1	15	3
June	91	34	52.38	1.59	14	4	12	9
July	75	39	55.31	2.62	15	3	13	13
August	76	39	57.11	5.69	20	1	10	12

COAL HARBOR, UNGA ISLAND. Henry S. Tibbey, Observer.

1902.								
September	63	33	48.7	4.98	2	7	21	20
October[a]	55	32	44.5	3.49	5	9	17	23
November[b]	.....	.....	.....	7.12	4	6	20	26
December	.....	.....	.....	1.30	11	7	13	11
1903.								
January	40	−10	23.1	3.90	12	5	14	14
February	45	−10	29.5	7.32	4	7	17	22
March	54	19	35.0	2.90	19	3	9	8
April	51	15	33.5	2.31	7	5	18	20
May	54	31	40.6	2.79	7	3	21	17
June	64	34	46.8	2.05	4	11	15	10
July	61	40	50.1	3.66	3	7	21	19
August	69	34	51.6	3.64	5	7	19	17
September	59	34	48.0	5.29	4	7	19	14

HERENDEEN BAY. George Jamme, jr., Observer.

1902.								
August	62	42	54.3	.....	.....	.....	.....	.....
September	62	32	48.9	.....	2	8	18	28

HERENDEEN BAY. Capt. J. Duncan, Observer.

1902.								
October[c]	56	23	34.25	5.10	3	3	23	24
November	47	12	33.5	6.30	4	2	24	23
December	45	− 7	20	.89	8	.....	23	.....
1903.								
January	41	−15	16.4	2.35	10	.....	21	10
February	44	−17	27.5	6.61	4	.....	24	15
March	49	15	31.4	1	8	6	17	10
April	45	15	32.3	2.25	1	6	23	16
May	53	30	39.6	2.59	2	8	21	21
June	65	32	47	1.01	4	9	17	8
July[d]	.....	.....	.....	.....	.....	.....	.....	.....
August	68	38	50.4	2.51	.....	3	28	18

[a] Fifteen days.
[b] Temperature not reported.
[c] Twenty-seven days only.
[d] Not reported.

Meteorological observations—Continued.

COPPER CENTER. R. Blix, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1902.	°F.	°F.	°F.	Inches.				
October	66	1	34.2	0.72	11	18	21	4
November	32	−46	− .5	1.50	17	11	2	4
December	34	−53	−12.4	1	20	8	3	2
1903.								
January	37	−60	−12.6		14	1	16	
February	43	−55	7.8		17	4	7	
March	44	−25	11.8	.2	21	8	2	1
April	58	25	24.0		22	7	1	
May	80	23	47.3	.60	6	16	9	6
June	96	30	56.9	1.38	5	18	7	8
July	87	29	58.4	.99	6	12	13	5
August	85	24	58.3	1.16	14		17	10
September	75	8	43.31	1.34	18		12	5

FORT GIBBON. Henry F. Simmons, Observer.

1902.								
October	53	− 9	27.56	1.79	10	15	6	16
November	15	−45	− 8.5	.31	18	8	4	1
December	25	−64	−19.82	1.36	40	9	8	14
1903.								
January	20	−66	−29.85	.37	15	7	9	6
February	35	−68	− 4.39	.73	8	7	13	13
March	39	−27	− 8.59	1.14	11	4	16	13
April	49	−39	14.7	.23	20	5	5	4
May	65	13	42.59	.16	19	6	6	3
June	88	33	53.8	.38	26	1	3	3
July	84	33	57.6	1.76	8	9	14	13
August	74	28	56.3	2.34	12	7	12	13

FORT YUKON. Leonidas J. H. Wooden, Observer.

1902.								
May		18						
August	81	40	59.4	.74				6
September	66	24	41.6	1.88				7
October		0		2.37				8
November		−51		1.60				5
December		−62		.75				8
1903.								
January		−65		.62				6
February		−58		1.09				9
April		−20		.34				5
May		8		.35				2
June		36		.77				3

June and July of 1902 not reported. March, 1903, not reported. August, maximum for 16 days. September for 15 days.

FORT EGBERT. C. A. Tunholtz, Observer.

1902.								
October	68	8	31.85	.76	9	2	20	9
November	20	−52	− 1.9	.62	16		14	4
December	28	−59	−21.37	.51	14		17	4
1903.								
January	41	−61	−19.07	.58	13	2	16	5
February	37	−55	3.04	.81	8	4	16	3
March	38	−33	8.85	.54	4	6	21	6
April	55	−32	20.91	.12	14	6	10	2
May	65	10	40.08	1.38	11	1	19	6

Meteorological observations—Continued.

FORT EGBERT. Capt. John B. Clayton, Observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1903.	°F.	°F.	°F.	*Inches.*				
June	87	32	63.78	4.57	25	.....	1	4
July	82	38	65.9	2.40	12	.....	19	10

TELLER REINDEER STATION. T. L. Brevig, Observer.

1902.								
January	36	−44	.....	7	9	3	19	2
February	36	−20	5.4	3	13	2	13	2
March	20	−28	−17.1	2	26	1	4	2
April	40	−29	19.0	4	17	2	11	5
May[a]	59	−20	20.0	.....	9	6	10	0
June[b]	75	31	44.92	.....	16	11	12	0
July	76	32	51.0	4.25	11	.....	18	9
August[c]	.....	.....	.....	.....	.....	.....	.....	.....
September[d]	60	26	40.34	.75	12	4	11	2
October[e]	47	11	31.96	2.25	.....	2	28	.....

POINT BARROW. H. R. Marsh, Observer.

1902.								
August	57	28	37.7	0.48	10	6	15	4
September	39	24	36.56	.1	2	7	21	4
October	36	5	25.23	1.41	3	6	22	8
November	22	−26	2.43	.42	7	4	17	3
December	25	−35	13.64	.....	23	.....	8	.....
1903.								
January	17	−52	21.78	.20	19	1	11	3

[a] May 26 days.
[b] June 29 days.
[c] August not reported.
[d] September 26 days.
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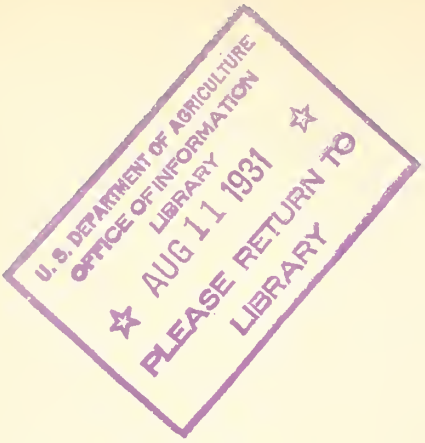
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